PRODUCTS finishing

DON G. GARDNER
President and General Manager

CCA
Member

FRED W. VOGEL, Editor
(On leave in U. S. Armed Forces)

Volume 8 | January, 1944 | Number 4

CONTENTS

Cadmium Plating Aircraft Parts.....18
By FRED M. BURT and C. L. SAVAGE

The Chemistry of Electroplating, Part 4.....28
By DR. C. B. F. YOUNG

Feathering the War Birds.....40
By JEFFREY R. STEWART

New Plating Process for Aircraft Instruments.....50

News of the Industry.....52

New Equipment and Materials.....58

The Finishing Touch.....68

Catalog Library.....70

Index to Advertisements.....72

JESSE R. HARLAN
Production Manager
ELOISE STEWART
Asst. Production Manager

BRYANT W. POCOCK
JEFFREY R. STEWART
H. LEROY BEAVER
Consulting Editors

C. B. F. YOUNG
Contributing Editor

JOHN M. KRINGS
Advertising Manager

RICHARD S. KLINE
Southwestern Manager
431 Main St., Cincinnati (2)
MAin 0182

G. M. FILLMORE
Eastern Manager
342 Madison Ave., New York (17)
Murray Hill 6-3899

RALPH M. FRENCH
District Manager
627 Union Commerce Bldg.
Cleveland (14) Main 2866

CHARLES H. DEILY, JR.
District Manager
310 West Durham St.
Philadelphia (19)
Chestnut Hill 1198

GEORGE H. MEYERS
Western Manager
Tribune Tower, Chicago (11)
Superior 2290

Published monthly by GARDNER PUBLICATIONS, Inc., 431 Main St., Cincinnati (2), Ohio
Printed in U. S. A. Copyright 1944 by Gardner Publications, Inc.
MORE THAN 16,000 CIRCULATION THIS ISSUE

LIXOL

Cowles'

EMULSION TYPE SOLVENT CLEANER

Removes

OIL · GREASE · SMUT · GRIME
DRAWING AND BUFFING COMPOUNDS
FROM
ALL METALS

LIXOL protects metal against rust and tarnish, leaves the surface ready for painting. It produces no chemical attack on sensitive metals. Small parts may be dipped in LIXOL at room temperatures and rinsed with either cold pressure rinse or hot still rinse. LIXOL may be brushed or sprayed on large parts, rinsed with pressure spray. Adaptable to simple equipment. Used in many plants for degreasing. No fumes or objectionable odor and harmless to hands. Immediate delivery. Suggestions as to application of LIXOL to your particular problem will be gladly furnished.

Order a trial supply TODAY!

THE COWLES DETERGENT COMPANY
METAL CLEANING DEPARTMENT
7016 Euclid Avenue **Cleveland 3, Ohio**

BUY MORE WAR BONDS

Products Finishing

PEACETIME plans for the porcelain enamel industry have recently been completed for development of its former pre-war markets and of new ones when facilities are released from present war production. The porcelain enamel industry is now largely tied up with work essential to the prosecution of the war, such as armor plate fabrication and heat treating, making bombs, welding and cutting steel plate, stamping and assembling numerous types of sheet metal containers, and even dehydrating eggs. Some plants in which porcelain enameling formerly was carried on in an important way are now, instead, producing large quantities of chemicals, refining ores, and even making tools.

A few plants are still manufacturing some enamel products and can be easily and quickly reconverted to peacetime items, but, it is believed, there are other plants that will require a complete revamping.

The Porcelain Enamel Institute, a trade association composed of 53 manufacturers and suppliers, started its post-war planning early during 1943 when it discovered the necessity for reconverting in 1944. Accordingly, the member companies provided a committee to plan for the future development. The work of this committee consisted of five divisions: market research, market development, materials improvement, process development, and plant operations.

The first findings of the Market Research Committee were presented on October 1, 1943, when it filed a report showing that the market in the seven years after the war might require twice as much procelain enamel as in the past seven years. It estimated the full potential requirements through 1950 to be 26,860,000 refrigerators, 19,815,000 washing machines, and 21,652,000 cooking ranges.

On November 9, 1943, the Market Development Committee presented a plan of promotional work for the industry involving a modest appropriation for advertising and selling literature. Ths plan was immediately approved and underwritten by the Board of Trustees of the Porcelain Enamel Institute. It is expected that, just as soon as materials needed for manufacturing operations are released, an ample supply of catalogs, bulletins and other promotional material will be available for general usage to assist members of the Institute. According to a recent report from the Porcelain Enamel Institute, the industry expects that production will be resumed in 1944 and that 1945 will be a record-breaking year.

Such foresight is commendable for all industry even though there can be no definitely prescribed moment when the post-war hour is to begin.

JANUARY, 1944 Vol. 8, No. 4

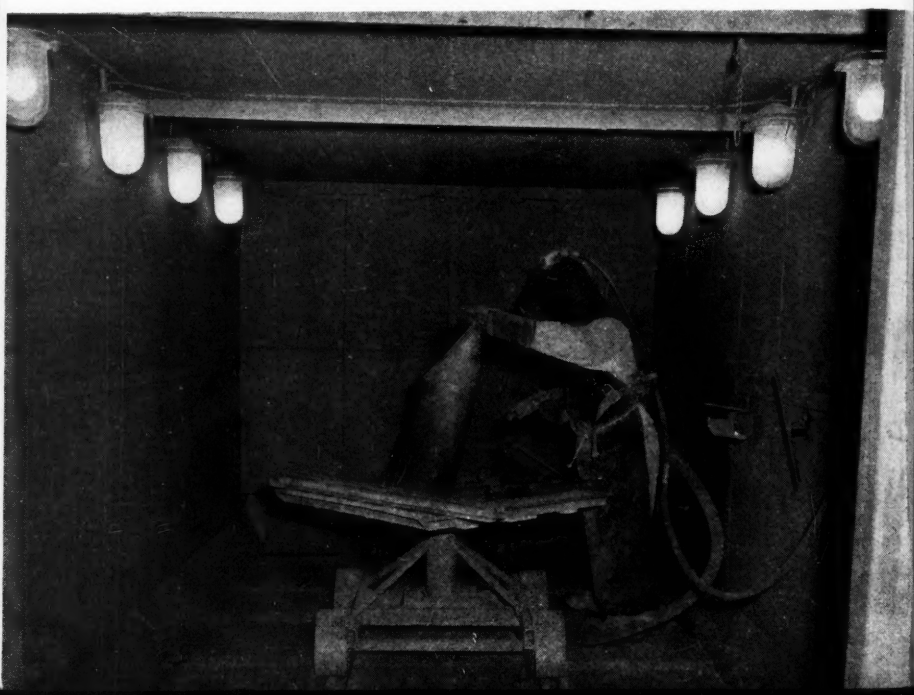
Cadmium Plating Aircraft Parts

By FRED M. BURT, Industrial Engineer, and C. L. SAVAGE, Supervisor

The Process Used in One of the Douglas Aircraft Company's Plants

UNDER present-day conditions of global warfare, aircraft must go literally everywhere under the sun and through every kind of weather and atmospheric condition. Hence it is important that metal parts, particularly those constructed of steel, be properly protected against corrosion. One approved method of protecting many of the parts used on the powerful A-20 Havoc attack bombers and the four-

Fig. 1—Sand blasting to remove scale from larger metal aircraft parts; scale is cut at the rate of approximately 15 feet per minute. Protective clothing guards the operator against breathing dust and sand.



Figs. 2, 3 and 4 — These three illustrations show skilled workmen "wiring up" parts by stringing them on iron wire or hanging them on racks for quick loading and unloading.

motored C-54 Skymaster transports as built by the Douglas Aircraft people is to cadmium plate such parts. The following pages will provide a pictorial showing various operations in the Douglas plant, graphically illustrating the modern methods used for cleaning and plating such parts.

The picture No. 1 shows the first or initial operation to remove scale from the larger units. Air pressure of 100 pounds is used to drive No. 1 silica sand through a 1¼-inch hose equipped with a ⅝-inch Borum nozzle. With this operation and under such pressure, the blast has a spread of about 4 inches and will cut scale at approximately 15 feet per minute. A second sand blasting operation is performed on steel parts after they are returned from the cadmium plating at which time 0.0005 inch of base metal is skillfully removed. Note how the operator is protected against the breathing

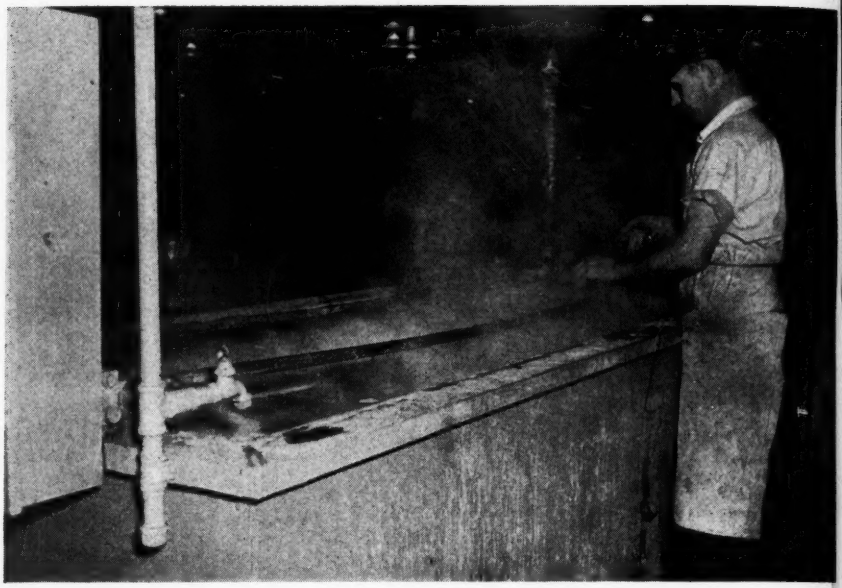


Fig. 5—Following a degreasing operation the parts are placed in the plater's cleaner tank shown here. The parts remain in the solution up to 10 minutes, although actual cleaning requires only 30 seconds.

of dust and fine particles of sand and silicosis.

From the sand blast the parts go to benches where skilled hands "wire up" parts by stringing them on 22-gauge iron wire. Some of the larger parts are hung on racks for quick loading and unloading. These racks are made of brass and coated with Unichrome and Detroit rack coatings. The parts must be suspended so they do not touch one another during the process of plating. These operations are shown in Figs. 2, 3 and 4. After the parts are strung or racked they are ready for degreasing which is accomplished in a Detrex degreasing machine using a Perm-A-Clor solvent.

From the degreasing machine the parts pass to the plater's cleaner tank, shown in Fig. 5, in which a solution of 5½ ounces of Kelite plater's cleaner to one gallon of water is used. This is heated to approximately 180 degrees Fahrenheit. The parts are hung from a bar charged with 12 volts of electricity. Here they can remain in solution up to 10 minutes, although actual cleaning requires but 30 seconds time. During this operation a slight oxidation occurs, though not perceptible to the eye as a rule.

After parts have been removed from the cleaner tank they are put in another tank which is divided into three sections. At one end an 18-inch section contains a cold, 5 per cent solution of hydrochloric acid. A 24-inch center section is a water rinse, and at the opposite end of the tank is an inflow of water at three or four gallons per minute. Air jets are provided to keep the water constantly and vigorously agitated. Following this is a bath in 5 per cent sodium cyanide solution to remove the film of

HOW TO SOLVE YOUR MOST DIFFICULT CLEANING PROBLEM

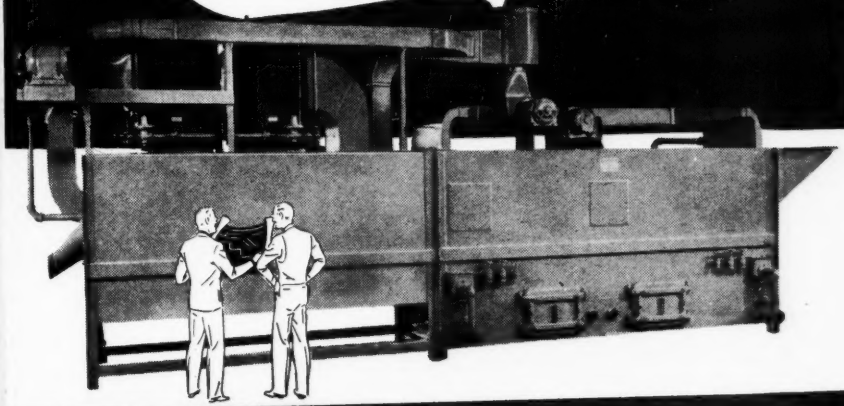
BALL BEARINGS . . . diesel engine blocks . . . small tools . . . airplane engine parts . . . cartridges . . . shells . . . chrome-plated parts . . . hardened gears — whatever you have to clean and finish — can be cleaned faster and more efficiently in A-F equipment especially designed and engineered to do the job or series of jobs required.

Alvey-Ferguson Cleaning and Finishing Equipment has 12 important features, many improvements over old-style washing and cleaning machines.

Write, without obligation, for folders illustrating how other famous companies solved their cleaning problems — or for a discussion of your particular problems with an A-F engineer.

THE ALVEY-FERGUSON COMPANY
623 Disney Street, Cincinnati 9, Ohio

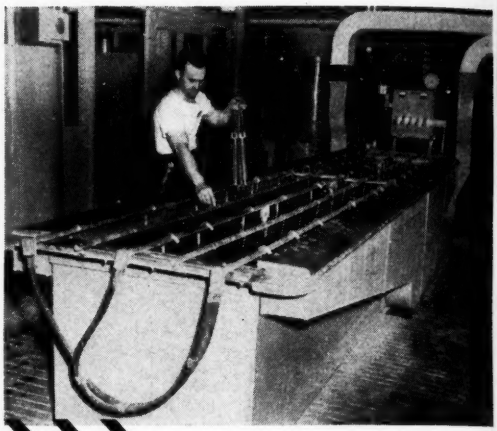
Affiliated Corporation
The Alvey-Ferguson Co. of California, P. O. Box 396, Vernon Branch, Los Angeles 11, Calif.



CONVEYING A-F MACHINERY

Alvey-Ferguson

Fig. 6—The parts are suspended in the scientifically designed plating tank on two work rods (cathodes); the other three rods are the anodes.



oxidation. This procedure properly conditions the parts before plating.

The actual plating of parts follows thorough cleaning and is accomplished in specially designed tanks which provide ventilation and means for carrying off any fumes. The plating tanks, as can be seen in illustration No. 6, have vents running the full length of each side to draw off fumes. These were scientifically designed as to fan capacity and vent and duct sizes to prevent the fumes from drifting off into the other parts of the room and up into the faces of operators.

Picture No. 6 also shows how the parts are suspended in the plating tank on two work rods. These work rods are the cathodes (negative) and the other three rods are the anodes (positive). Parts are spaced at intervals of 6 inches so that they will be an equal distance apart, surrounded by an equal amount of solution and with an even distance between the anodes and the cathodes. The standard plating solution used in this operation is as follows:

11 ounces sodium cyanide
3 ounces cadium oxide
3 ounces caustic soda
2 ounces sodium carbonate
1 gallon water

Plating is started on 2 amperes per square foot and a low voltage of 1½ or 2 volts which is gradually increased to 6 volts. The voltage is applied in that manner because plating starts on the outside edges first and more uniform

Fig. 7—After plating the parts are rinsed in a 5 per cent solution of chromic acid and passed on to the dryer shown here.

CONVERSION

Now it can be done Easily

from CADMIUM PLATING *to* ZINC PLATING

with PROMAT NO. 90.

Maintain Your Present Production with No Additional PLATING TANKS

Conversion to PROMAT consists of using Promat No. 90 electrolyte in your present tanks and the installation of a Promat alternating current Kicker

Promat No. 90 Zinc Plating Process, utilizing new chemical compounds and new electrical wave forms, increases the rate of zinc deposition from that obtained with a conventional zinc bath to a rate comparable to that obtained from a conventional cadmium bath. This has been proven highly successful in a number of large commercial installations.

Promat No. 90 Process provides high luster, excellent throwing power, uniformity of deposit distribution, good ductility and close grain structure.

The cost of this conversion is very reasonable. The Promat No. 90 Process will produce lower unit operating costs than either conventional zinc or cadmium plating processes. The installation of Promat No. 90 zinc is simple and can be accomplished in minimum time with little effort.

The PROMAT Alternating Current KICKER

Call in a Promat engineer by contacting the Promat Division or C. F. R. Sales Company to arrange for an immediate conversion.

The PROMAT DIVISION, Poor & Company

851 S. MARKET STREET
WAUKEGAN, ILLINOIS

EASTERN OFFICE C.F.R. SALES CO.
538 FOREST ST., KEARNY, N. J.

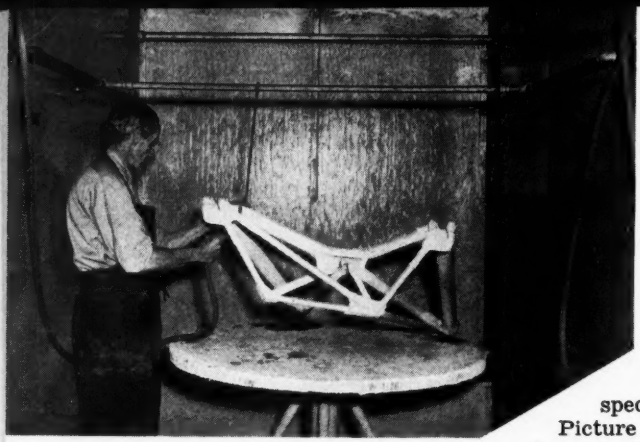


Fig. 8—To prevent the possibility of the sodium cyanide solution remaining inside tubular parts and thereby creating a health hazard, the parts are blown clean with an air jet.

plating is built up. After the base metal is coated sufficiently the voltage is then increased. After plating is completed, parts are rinsed in a 5 per cent solution of chromic acid and pass on to the dryer shown in picture No. 7. Since many of the parts are tubular and have holes in them, it is necessary to prevent a health hazard that may result from the entrance of the sodium cyanide solution inside the tube. Therefore, parts are blown clean with an air jet operating within a special water-wash booth. See Picture 8. Again, the parts are placed in the drying oven as shown in picture No. 7.

The plating solutions are frequently filtered to remove dust, dirt, oil and grease. For that purpose a large and efficient portable filtering machine can be moved up to the side of each tank for speedy operation. See picture No. 9.

A double check is made on the quality of the finish on all parts. Once a month samples are taken from actual production, one going to the process engineer's department of the Douglas plant and the second to the Bureau of of Standards in Washington, where they are given severe tests. One of these involves a salt spray test for 250 hours.

Even the inside of parts made of

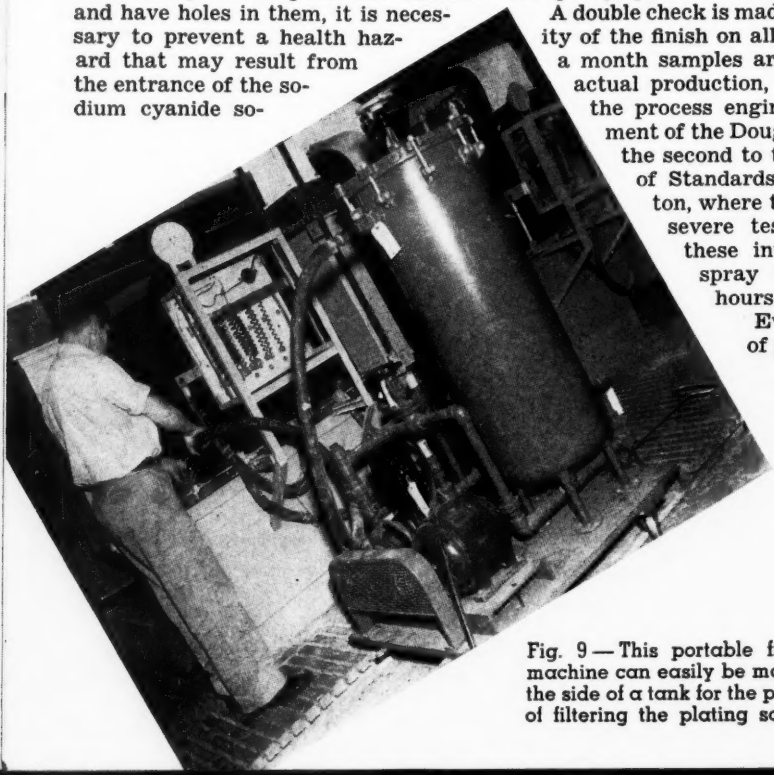


Fig. 9 — This portable filtering machine can easily be moved to the side of a tank for the purpose of filtering the plating solution.

READY FOR ACTION... QUICK CLEAN-UPS

SUN SPIRITS

speeds cleaning of precision plane parts

To help speed his production, one manufacturer of aircraft parts has been using Sun Spirits for cleaning throughout the plant. This modern, pure petroleum solvent meets the needs for the majority of cleaning operations because it is:

Fast... always ready for use— requires no mixing or heating.

Thoroughly efficient— leaves parts sparkling clean — ready for the next process.

Economical— because it's long lasting . . . easily reclaimed.

Safe — approved by National Board of Fire Underwriters for industrial use.

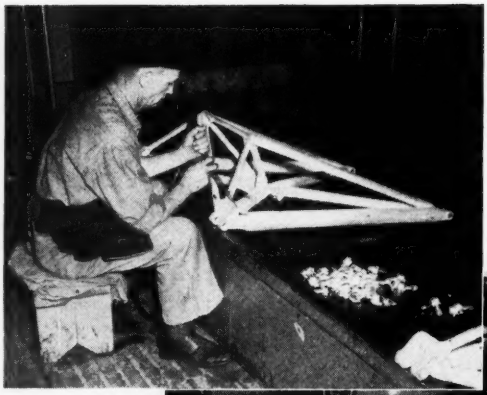
For helpful, factual information on metal cleaning, write for your free copy of "Case Histories of Cleaning Up War Parts."

SUN OIL COMPANY · Philadelphia 3, Pa.

Sun Oil Company, Limited, Toronto, Canada

SUNOCO

SUN INDUSTRIAL PRODUCTS HELPING INDUSTRY HELP AMERICA



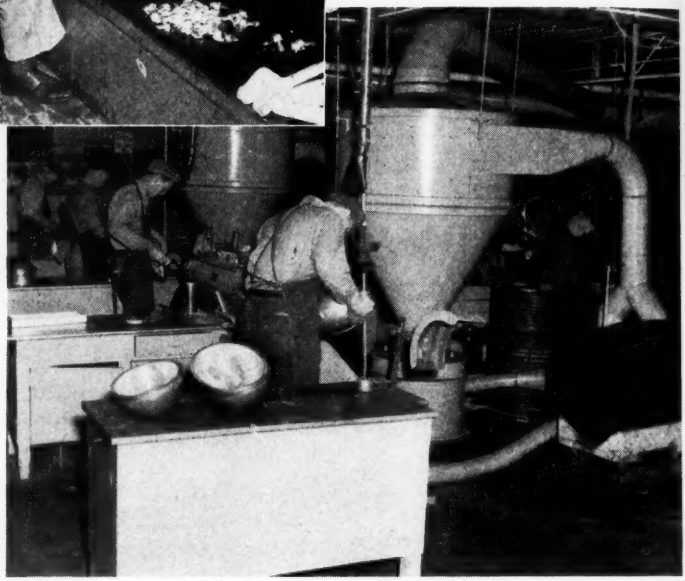
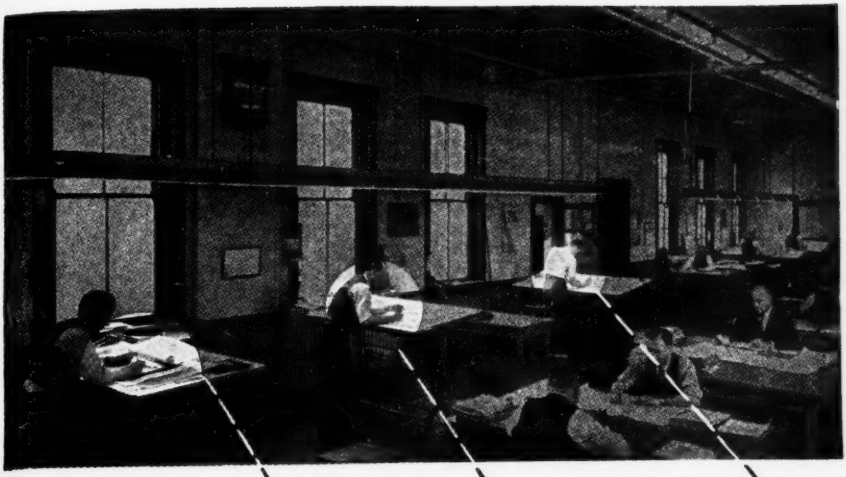


Fig. 10—A heavy coating of linseed oil is placed on the inside of tubular parts; the oil is forced into the tubing under pressure and then the excess is drained out. The coating congeals within about four hours. Fig. 11—Parts which must be buffed and polished are routed to this department, which includes an efficient, modern installation of machines and ventilating equipment.

tubing is given a coating of linseed oil heated to 160 degrees Fahrenheit. This inside finish is accomplished by filling the tubing with linseed oil as shown in picture No. 10. The oil is introduced into the tubular part under pressure and afterwards drained onto the sloping drainage area, leaving a heavy coating inside to congeal in approximately four hours time.

Finally, many of the parts must be buffed and polished in another department. Picture No. 11 shows a battery of buffing machines that are installed in most modern fashion, including the blower systems for withdrawing dust and grit from the grinding.

Yale Electric Industrial Trucks. To acquaint industry with its war-standardized line of electric industrial trucks, The Yale & Towne Mfg. Co., Philadelphia Division, Philadelphia, Pa., has published a 76-page catalog containing detailed descriptions of all models, as well as a large number of illustrations showing many uses of industrial power trucks. A separate section is devoted to the workings of the War Production Board's Limitation Order No. L 112 as applied to Yale industrial trucks. Copy of catalog free upon request.



DUST and FUME CONTROL is a job for . . .

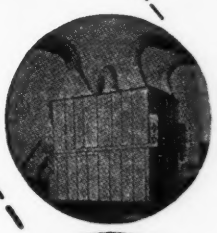
ENGINEERING SPECIALISTS

An efficient dust or fume control system is a combination of various mechanical units, each of which is the *right* unit for the specific job to be done. Selection of the most efficient units for each kind and condition of dust and air is highly important—and highly difficult. It is decidedly a job for engineering specialists.

The Kirk & Blum Engineering Staff, qualified by over 36 years of experience in this particular field, first makes a thorough analysis of your special dust or fume control problem. Next, our Staff selects the right units for *your job* from among the various makes available —then designs and installs a complete system that is *guaranteed* by Kirk & Blum to give the results you want.

Don't take chances with a "half-way" dust or fume control system. Don't risk being "sold" on a unit or units that may not be right for your individual job. Get the unbiased counsel and planning of experts—Kirk & Blum Engineers. For details write to

THE KIRK & BLUM MANUFACTURING CO.
2816 Spring Grove Ave., Cincinnati, Ohio



Dry products and clean air required; cloth filter selected.

Wet process air cleaning using ROTOCLONE.

Centrifugal separator suitable for heavy dust concentration.

KIRK AND BLUM AN ORGANIZATION OF ENGINEERS AND MECHANICS.

The Chemistry of Electroplating

By Dr. C. B. F. Young, Consultant

Part 4

IN the preceding issue several compounds and elements were discussed, and then some theories were propounded. In the present one chemical equations and calculations are put forth. This is a very important section of the study and should be thoroughly understood by those interested. The last part of this series deals with muriatic or hydrochloric acid, sodium chloride and chlorine.

An endeavor will be made to use the knowledge gained in the preceding issues. This information will be placed together so that a chemical reaction can be written with a few symbols which are in the form of an equation. It must be borne in mind that if a chemical equation is not right throughout, it is all wrong. Take, for example, the combination of mercury and sulfur. Here a silver-colored liquid is added to a yellow powder and there is produced a black material. A chemical change has taken place because one can see the physical difference of the materials before and after. This can be expressed in the words of the chemist as follows:

$$Hg + S = HgS$$

It will be noted that all the starting materials are located on the left, namely mercury and sulfur, and all the resulting materials are placed on the right of the equals mark. (An arrow is sometimes used, which means produces or forms.) Therefore, it is essential that the number of atoms on the left equals the number of atoms on the right. Check over the equation and see if this is true. On the left there is one mercury and one sulfur atom and on the right there is present one mercury and one sulfur atom. Thus, this is a true equation, being mathematically correct. Take another case, for example, the combination of hydrogen and oxygen to form water.

$$H_2 + O_2 = H_2O$$

It will be noted that two atoms of hydrogen and two atoms of oxygen are on the left, while on the right there are two atoms of hydrogen, but only one atom of oxygen. Therefore, this statement is not right as it stands. It is not an equation because the material on the left side does not equal the material produced on the right side. Something must be done in order that the number of atoms on the left equals the number on the right, because, as was learned earlier, matter can neither be created nor destroyed.

As the equation now stands, one oxygen (0) has been destroyed — at least it is unaccounted for. It was also learned that hydrogen is always in the form of H_2 and each atom has a valance of one, while oxygen is always in the form of O_2, and each atom has a valance of two. Thus, the formula for water would have to be H_2O because oxygen has twice the valence of hydrogen. How can this situation be adjusted?

Upon close examination of the statement $H_2 + O_2 = H_2O$ it will be noted that there is not enough oxygen on the right side of the equation. If a 2 is placed in front of the H_2O, there will now be two oxygens on the right the same as on the left, but in doing this the amount of hydrogen atoms has been doubled; that is, $2H_2$ which is four hydrogens. Now if a 2 is placed in front of the H_2 on the left side of the equation, it will now be balanced.

$$2H_2 + O_2 = 2H_2O$$

Check the above statement and see if it is true. There are four hydrogens on the left; also, four hydrogens on the right with two oxygens on the left and two oxygens on the right. Therefore, the equation is balanced. Another example might help to clarify the situation. Take the equation

Zinc + Hydrochloric acid = Zinc chloride + Hydrogen

This can be written as follows:

$$Zn + HCl = ZnCl_2 + H_2$$

It can readily be seen that zinc has a valence of two; therefore, it will require two chlorines. Thus, the formula for zinc chloride is $ZnCl_2$. Hydrogen is always in the form of H_2 if in the free state. On examining this statement it can be seen that the equation is unbalanced. On the right there are two chlorines, while on the left there is one, and on the right two hydrogens are present, and on the left there is only one. How can this equation be balanced?

It will be noted that two hydrogens and two chlorines are needed on the left. It so happens that the formula for hydrochloric acid is HCl and this cannot be changed. Nature fixed it this way. It would be utterly wrong, therefore, to write H_2Cl_2, which would balance the equation, as this is not a true statement. However, a 2 can be placed before the hydrochloric acid, giving 2HCl and obtaining the desired results. In order to balance the equation then, a 2 is simply inserted before the HCl as follows:

$$Zn + 2HCl = ZnCl_2 + H_2$$

In order to check an equation to see if it is correct, write the equation down after balancing and draw a mark through each element or molecule which appears on both sides of the equation. Thus:

$$\not{Z}n + 2\not{H}\not{C}l = \not{Z}n\not{C}l_2 + \not{H}_2$$

It will be noticed that all elements and molecules are crossed out, indicating that the equation is balanced. If all atoms or molecules are not crossed out, the equation is still in the unbalanced state.

Before writing the equation one must know (1) that the change takes place, (2) what elements or compounds are formed, (4) the formulas of all materials used or produced. Remember to use the molecular formulas for the gaseous elements, thus, O_2, H_2, N_2, Cl_2, Br_2, and so on.

If a number is placed before a compound as 2 HCl, it means that there are two molecules of hydrogen chloride which may be written 2 x (HCl). Thus, there must be two hydrogens and two chlorines. For water, $2H_2O$, there are four hydrogens and two oxygens. It must be remembered that a 2 placed before a compound doubles the amount of every element in that compound.

In order to simplify the writings of equations, all types may be divided into five general classes. This, of course, is a help when trying to form an equation.

Type 1, Simple Decomposition

By the word "decomposition" it can be seen that a material is being decomposed, or another way of expressing this would be to say that a compound is breaking up into two or more simpler materials. Thus, the decomposition of water into its two elements, hydrogen and oxygen, is a good example of simple decomposition. Thus:

$$2H_2O = 2H_2 + O_2$$

Type 2, Direct Combination

This type of reaction, as can be seen from the name, "combination," is the reverse of decomposition. When two or more materials are combined chemically, direct combination results. Thus:

$$2H_2 + O_2 = 2H_2O$$
$$H_2 + Cl_2 = 2HCl$$
$$C + O_2 = CO_2$$

Type 3, Simple Replacement

In this type one element is replaced by another as the word "replacement" would indicate. Thus:

$$Zn + 2\,HCl = ZnCl_2 + H_2$$
$$Zn + H_2SO_4 = ZnSO_4 + H_2$$
$$2Al + 3H_2SO_4 = Al_2(SO_4)3 + 3H_2$$

In the above cases zinc and aluminum replaced hydrogen from hydrochloric and sulfuric acids.

Type 4, Double Decomposition

When two compounds break up into parts and unite with a different part of the other compound, the reaction is known as double decomposition. The name implies two materials decomposing. A general statement of this would be:

$$AB + CD = AD + BC$$

Two good examples are as follows:

$$AgNO_3 + NaCl = AgCl\downarrow + NaNO_3$$
$$CaCl_2 + Na_2CO_3 = CaCO_3\downarrow + 2NaCl$$

Incidentally, the first above equation expresses the method for determining the chloride in nickel plating solutions. An arrow pointing down indicates the formation of a precipitate.

Type 5, Oxidation and Reduction

This type of equation has been mentioned before, but it might be said here that oxidation is the loss of electrons which, incidentally, happens at the anode, while reduction is the gain of electrons which happens at the cathode of an electroplating solution. Oxidation and reduction can take place, of course, outside of electroplating solutions. Oxidation simply means the combination of a free element with another element which really is direct combination, while reduction, coming from the verb to reduce, means to separate. Thus, if a metal is separated from a compound and is produced in the pure state, reduction takes place. Both of the above happen in a nickel plating solution. At the anode the nickel dissolves, forming nickel sulfate, which is oxidation. At the cathode the opposite is taking place and the nickel is being separated from the sulfate radical, thereby producing metallic nickel. This, of course, is reduction.

Many times the electroplater desires to know how much nickel a given amount of nickel sulfate contains or how much barium chloride should be added to precipitate an excess of sulfuric acid in a chromic acid plating bath. These are important and the electroplater must know how to solve such problems if he expects to become efficient. The percentage composition problem will be discussed first.

Assume that the amount of copper in copper sulfate is desired. The formula for copper sulfate is $CuSO_4$. Now this means that copper sulfate is composed of one atom of copper, one atom of sulfur, and four atoms of oxygen. Copper has an atomic weight of 63.6, sulfur of 32, and oxygen of 16. Write down these in order.

$$\begin{aligned} Cu &= 63.6 \times 1 = 63.6 \\ S &= 32 \times 1 = 32 \\ O &= 16 \times 4 = 64 \\ &\quad\overline{\quad\quad} \\ &\quad 159.6 \end{aligned}$$

It can be seen from the above that there is one part of copper which weighs 32, but four parts of oxygen and each part weighs 16, giving a total of 64. Now, on adding up these figures, 159.6 is obtained, which is the total weight of all the elements making up copper sulfate. In order to obtain the percentage of copper, the amount of copper which is present in the formula is divided by the weight of the copper sulfate. This may be expressed as follows:

$$\frac{\text{Wt. of copper in } CuSO_4}{\text{Wt. of } CuSO_4} \times 100 = \text{per cent Cu in } CuSO_4$$

The ratio is multiplied by 100 so that the answer will be in whole figures and not decimals. Thus, we have 39.9 per cent and not 0.399. This equals 63.6 divided by 159.6 = 0.399 or 39.9 per cent. For the percentage of sulfur in $CuSO_4$ sulfur, 32, is divided by 159.6 = 0.0200 or 20.0 per cent. Also, for the percentage of oxygen we would have 64 divided by 159.6 = 0.401 or 40.1 per cent. What does this mean to the electroplater? It simply means that copper sulfate is made up of

Cu	=	39.9 per cent
S	=	20.0 per cent
O	=	40.1 per cent
		100.0 per cent

This adds up to give a total of 100 per cent which accounts for all parts of copper sulfate. Every formula is figured the same way.

A properly balanced chemical equation gives the following information: (1) What materials react? (2) What materials are formed? (3) The number of atoms or molecules of each substance involved. (4) By using the atomic and molecular weights the amounts of the materials involved can be calculated. Take for example the equation:

$$2H_2O = 2H_2 + O_2$$

From the above it is known that (1) water can be decomposed. (2) Hydrogen and oxygen are formed. (3) Two molecules of water are utilized in producing two molecules of hydrogen and one molecule of oxygen. It can further be seen that each molecule of water is composed of one molecule of hydrogen and one atom of oxygen. By writing the atomic or molecular weights under the corresponding compound as follows:

$2H_2O$	=	$2H_2$	+ O_2
2(18)		2(2)	32
36		4	32

it can be seen that 36 parts of water will form four parts of hydrogen and 32 parts of oxygen. It must be impressed upon the student that this is not assumed, but is so fixed by scientific facts. Thus, if one goes to the laboratory and decomposes 36 parts of water, in every case four parts of hydrogen and 32 parts of oxygen will be obtained. The reverse is also true. Thus:

$$2H_2 + O_2 = 2H_2O$$

In the above case four grams of hydrogen require 32 grams of oxygen to produce 36 grams of water. This would have to be so, otherwise the law of conservation of matter would not be true. Water is always formed with the same percentage of hydrogen and oxygen. It will always be found that four grams of hydrogen unite with 32 grams of oxygen to produce 36 grams of water.

The same thing is true if pounds

BETTER PLATING, LESS COST!
"MGC" ELECTROPLATING EQUIPMENT
Write for Interesting Details TODAY!
MOTOR GENERATOR CORP., HOBART SQ. BOX PF 14 TROY, OHIO

are used. Thus, four pounds of hydrogen must unite with 32 pounds of oxygen to produce 36 pounds of water. As long as the units are the same—namely, grams, pounds, tons, carloads, or shiploads — the results are predictable, but the units must **always** be the same throughout. It will be noted from the above equations that two molecules of water or two formula weights are required. Thus, to obtain the amount of water the formula weights are added and the whole multiplied by two. The same is true with hydrogen. One molecule of hydrogen is used two times. Therefore, the weight of one molecule must be multiplied by two.

Suppose two boys, John and Tom, are carrying a quantity of oranges in a warehouse. John can carry twice as many oranges as Tom. If John carries 30 oranges at one time, how many oranges does Tom carry? Tom carries, of course, 15 oranges. How do we get this? In your mind you said that John carries two oranges while Tom carries one. Now, if John carried 30 oranges, Tom carried one-half this amount or 15. Now, set this up mathematically:

Ratio of oranges carried by J. and T.

$$\frac{2}{1} = \frac{30 \text{ oranges J. carried}}{x \text{ oranges T. carried}}$$

Thus: $\frac{2}{1} = \frac{30}{x}$

Now to solve this problem we need only to cross multiply. For example:

$AD = BC$ cross multiplying

$D = BC$ solving for D

A

Going back to the original problem, it can be solved as above:

$$\frac{2}{1} = \frac{30}{x}$$

$$2x = 30 \times 1$$

$$2x = 30$$

$$x = \frac{30}{2} = 15, \text{ the number of oranges carried by Tom}$$

Now take this reasoning over to chemistry. Suppose one desires to know how much water can be formed from 10 grams of hydrogen, using an excess of oxygen. In order to solve this problem go through the six steps listed below:

1. Read problem over carefully.
2. Write the equation.
3. Balance the equation.
4. Write under each atom or molecule the atomic or molecular weight.
5. Multiply the atomic or molecular weight by the number appearing before the symbol in the equation.
6. Write above the symbol any given quantity. In this case the given quantity is 10 grams of hydrogen. Therefore, put 10 grams above the symbol H_2O and x above the material desired which, in this case, is water. Thus, writing the equation:

$$H_2 + O_2 = H_2O$$

Balancing:

$$2H_2 + O_2 = 2H_2O$$

Adding atomic or molecular weight:

$$\underset{2(2)}{2H_2} + \underset{32}{O_2} = \underset{2(18)}{2H_2O}$$

Multiplying:

$$2(2) + 32 = 2(18)$$

$$4 + 32 = 36$$

Writing quantity above symbol:

$$\underset{4}{\overset{10}{2H_2}} + \underset{32}{O_2} = \underset{36}{\overset{X}{2H_2O}}$$

Looking closely at what we have, disregarding the equation. It is

$$\frac{10}{4} = \frac{X}{36}$$

It will be noted that the O_2 and its atomic weight 32 does not enter into solving this problem as the problem states that an excess of oxygen is present. Now solving the equation as

AIRPLANE LANDING MATS provide footing for aircraft on treacherous terrain. On beaches, in cleared jungles, on captured air fields, these metal mats make it possible for our fighting air force to hammer the enemy from newly gained vantage points.

Pennsalt Metal Cleaner helps speed the output of this vital equipment. During blanking, ribbing and slotting, paraffin and mineral lubricating oils collect on the mats. These must be removed prior to painting.

The landing mats are carried on a chain conveyor through the following sequence of operations: First, soak cleaning with Pennsalt Cleaner in a 1200-gallon tank at 212° F.; then a cold water rinse in an 800-gallon tank; finally, a hot rinse in an 800-gallon tank containing rust inhibitor.

To date millions of square feet of landing mats have been cleaned with Pennsalt Cleaner with highly satisfactory results . . . This is another wartime cleaning job which demonstrates again the effectiveness of this famous family of metal cleaners.

Why not put *your* metal cleaning problems up to our thoroughly experienced staff of technicians? No obligation. Write fully to Dept. PF.

PENNSYLVANIA SALT
MANUFACTURING COMPANY
Chemicals

1000 WIDENER BUILDING, PHILADELPHIA 7, PA., U.S.A.

NEW YORK • CHICAGO • ST. LOUIS • PITTSBURGH
MINNEAPOLIS • WYANDOTTE • TACOMA

before we have:

$$4X = 36 \times 10$$
$$4X = 360$$
$$X = \frac{360}{4} = 90$$

Thus, 90 grams of water will be produced from 10 grams of hydrogen.

Let us check up on the mathematics and see if the answer is correct. By examining the equation it will be seen that for every four parts of hydrogen, one must have 36 parts of water. Therefore, the weight of water produced from a given weight of hydrogen is 9 times as great, which is obtained by dividing 4 into 36. Now, originally there were 10 grams of hydrogen and the weight of water should be 9 times this amount, or 90 grams. In solving an equation of this type, the fixed rules given above should be used. The atomic weights used in all problems can be obtained from the list given earlier in this series. (See December issue.)

Let us solve another problem. How many grams of barium chloride will be required to precipitate 10 grams of excess sulfuric acid in a chromium plating bath?

1. By reading the problem carefully it will be found that X equals barium chloride and the given quantity is 10 grams of sulfuric acid.

2. $BaCl_2 + H_2SO_4 = BaSO_4 + HCl$

3. $BaCl_2 + H_2SO_4 = BaSO_4 + 2HCl$

4. $\underset{207}{BaCl_2} + \underset{98}{H_2SO_4} = \underset{233}{BaSO_4} + \underset{2(36.5)}{2HCl}$

5. $\underset{X}{207} + \underset{10\ g}{98} = 233 + 73$

6. $\underset{207}{BaCl_2} + \underset{98}{H_2SO_4} = \underset{233}{BaSO_4} + \underset{73}{2HCl}$

$$\frac{X}{207} = \frac{10}{98}$$
$$98X = 2070$$
$$X = \frac{2070}{98} = 21.1$$

Now, checking up to see if the answer is correct, it will be noted that for every 98 grams of sulfuric acid in excess one must have 207 grams of barium chloride or approximately twice as much barium chloride as sulfuric acid. As 10 grams sulfuric acid are present, therefore, there should be approximately 20 grams barium chloride. This checks the answer as it is 21.1.

Sodium chloride is a salt which is formed by the uniting of an atom of sodium with an atom of chlorine. Nature has given man a rather abundant and cheap supply of this material and, for this reason, it is used as a starting product for producing other chemicals. If an electric current is passed through a solution of sodium chloride one might think that the current would decompose the salt into its component parts, sodium and chlorine. However, if the products formed are examined it will be found that instead of sodium and chlorine being produced, hydrogen and sodium hydroxide are formed, the latter remaining in solution. This can be explained as follows:

$$2NaCl = 2\ Na + Cl_2$$

The sodium thus produced is a very active material, so much so that it will unite with the water at once and form a material which is called sodium hydroxide, according to the equation following:

$$2Na + 2H_2O = 2NaOH + H_2$$

These two equations take place simultaneously and in this way chlorine, hydrogen, and sodium hydroxide are produced. Sodium hydroxide and chlorine are very important materials and the industry uses large quantities of them. For this reason large amounts of salt are electrolyzed in order to produce sodium hydroxide and chlorine.

Chlorine can be prepared in several methods in the laboratory, but a very good method is to set free the chlorine contained in hydrochloric acid by allowing manganese dioxide to react with hydrochloric acid according to

the equation:

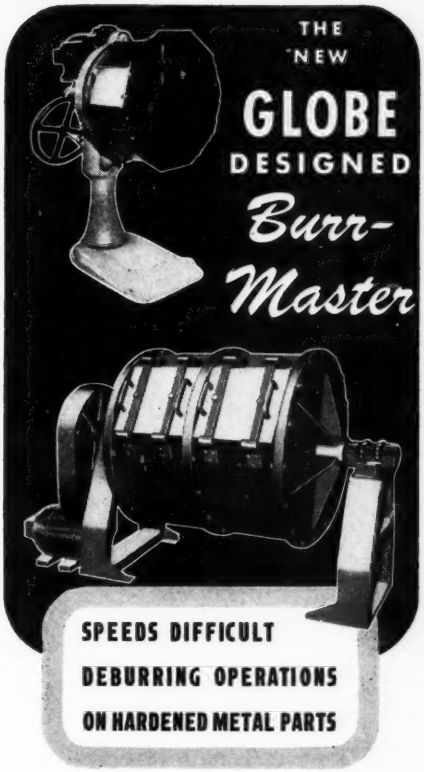
$4HCl + MnO_2 = MnCl_2 + 2H_2O + Cl_2$

The chlorine produced by this method is different from the other gaseous elements discussed. Most of the others have been colorless, odorless, tasteless gases, but chlorine is a greenish yellow gas with a very pungent and cutting odor. It is poisonous if breathed in sufficient quantities. The material is very active as it combines with many metals at room temperatures to produce chlorides. Chlorine is so extremely active that it is used to kill germs. Being soluble in water, forming hydrochloric acid (HCl) and hypochlorous (HOCl). Chlorine, because of its oxidizing properties, is used to a great extent in industry. The material can be formed by the electrolysis of sodium chloride as shown above.

If sulfuric acid is gently dropped on sodium chloride it will be noted that a chemical reaction occurs because bubbles of gas begin to form on the salt and rise through the solution. A rather sharp, pungent odor will be noted. This is due to the fact that a gas is liberated known as hydrogen chloride according to the equation below:

$H_2SO_4 + 2NaCl = Na_2SO_4 + 2HCl$

In this case it will be noted that hydrogen unites with the chlorine to form HCl and the sodium unites with the sulfate to form Na_2SO_4. This, it will be recalled, is double decomposition. In this experiment it will be noticed that the hydrogen chloride escapes as a gas. If the gas is led into a bottle containing pure water, it will dissolve quite readily, forming an acid which is hydrochloric or muriatic acid. This material is very important to the electroplater as it is used to form many pickling and etching solutions used in the trade. It will be noted, however, that in the gaseous state HCl is known as hydrogen chloride. However, if this gas is dissolved in water it becomes hydro-



● The new Burr-Master Tumbling Barrels were originated by Globe to provide a more rapid means of cleaning and deburring today's tougher metal parts. The Burr-Master comes in two sizes. The Standard (top illustration) and the Senior (below). The Standard is equipped with a low speed, gearhead motor and is the tilting type for easy loading and unloading. The Senior is a double compartment, horizontal type with watertight shells. The Senior is recommended where large quantities of parts are to be deburred. Write for new Burr-Master literature today.

THE Globe
MACHINE AND STAMPING CO.
CLEVELAND 2, OHIO

Give him the answers before it's too late!

● When fire breaks out at your plant, will the confusion of your men give the blaze time to get out of control? Not if they've been shown exactly what to do. Men *who know how* act swiftly and confidently to nip small fires.

Make sure your key men have the training they need. Stage a demonstration now. Let them see your equipment go into action against real fires. Explain the different types of fire and the right way to fight each of them.

To help you plan an interesting, instructive show, Walter Kidde & Company has issued a booklet, "HOW TO TEACH FIRE FIGHTING." Write for your free copy today.

WALTER KIDDE & COMPANY, INC., 145 MAIN STREET, BELLEVILLE, N.

SHOULD I TURN IT UPSIDE DOWN?
WHAT'S THAT PIN FOR?

Kidde

chloric acid. It so happens that the gas is very soluble in water, forming the acid when dissolved. Hydrochloric acid is a very active material and will react with many elements and compounds. For instance:

$$Fe + 2HCl = FeCl_2 + H_2$$

Here, it will be noticed, the iron takes the place of the hydrogen in the acid. This type of equation comes under the heading of displacement. Hydrochloric acid is a colorless liquid having a density of about 1.2 grams per cubic centimeter.

When an element unites with chlorine a chloride is produced. Thus, in the above equation, the iron united with hydrochloric acid to form ferrous chloride. In the same manner:

$$Zn + 2HCl = ZnCl_2 + H_2$$

In this case zinc chloride is formed.

All the common chlorides are soluble in water except three. These are silver chloride, lead chloride, and mercurous chloride. This is such an important group of compounds that it is always essential to have a test for them. The electroplater, for instance, desires a test for the chlorides in his nickel plating solutions. It will be recalled from above that all common chlorides are soluble in water except the chlorides of silver, lead, and mercury. Therefore, silver chloride, being insoluble in water, should precipitate out of solution as formed.

In the case of the electroplating solutions chlorides are present in a nickel plating solution in the form of sodium or ammonium chlorides. If a salt of silver is added, the silver chloride should form as a white precipitate — which is just what happens. Thus, to the nickel sulfate plating solution containing a chloride, if a silver nitrate solution is added, the white precipitate of silver chloride immediately forms according to the equation:

$$NH_4Cl + AgNO_3 = AgCl + NH_4NO_3$$

The electroplater desires a method of knowing just how much chloride is present. Now, by adding a small amount of potassium chromate to the solution it will be noted that when all the chloride is removed, a second precipitate occurs which is silver chromate. However, the color of silver chromate is red brown and not white. Thus, this color change gives the electroplater an end point or tells when all the chloride has been removed from the solution. This reaction is as follows:

$$K_2CrO_4 + 2AgNO_3 = Ag_2CrO_4 + 2KNO_3$$

If hydrogen chloride is decomposed into hydrogen and chlorine by electrolysis it will be found that an equal volume of hydrogen and an equal volume of chlorine are produced. This shows that hydrogen chloride contains as much hydrogen as it does chlorine volume for volume. Of course, this is not true by weight because hydrogen is much lighter than chlorine. This can easily be proved if the above reaction is reversed and hydrogen chloride is prepared by allowing equal volumes of hydrogen and chlorine to unite. If one volume of hydrogen is placed in a vessel along with one volume of chlorine and an electric spark used to unite these, an explosion results. After the reaction takes place, it will be found that there is no free chlorine or hydrogen. This can be represented as follows: One volume of H_2 + one volume of Cl_2 = two volumes of HCl.

(Part 5 will be published in our February issue)

Potentiotrols. Wheelco Instruments Co., Harrison and Peoria Sts., Chicago 7, Ill., has issued Bulletin A2-3, describing its line of Potentiotrols. The eight-page bulletin describes the potentiometer method of heat measurement and explains the electronic principle employed in Wheelco instruments to gain instant control in line with the temperatures recorded. Also included is a list of instrument features, four operating diagrams, and a table of potentiotrol scale ranges obtainable with various thermocouples and a photoelectric pickup unit.

★Engineered for today's war needs

★...and *tomorrow's* production

rar-seeing executives are installing Mahon *Finishing* Equipment for present-day needs—*but with a shrewd eye to the future.* This recently installed Mahon Down-Draft, Hydro-Filter Spray Booth in combination with a modern Mahon Drying Oven is at present assigned to the production of war materials. It is specifically designed, however, for the finishing of the purchaser's standard product, immediately war production ceases. The entire installation is modern-to-the-minute—straight line routing of work through both Spray Booth and Drying Oven—and is equipped with Mahon control and safety features which make for fast, efficient, economical operation. Let Mahon *Finishing* engineers look over YOUR plant—plan finishing equipment to speed up your present production—AND SAVE YOU MONEY—TOMORROW.

Above . . . Looking through both Spray Booth and Drying Oven for a distance of over 200 feet—Spray Booth is 96 feet long—Drying Oven 120 feet in length. Downdraft feature of Spray Booth furnishes abundance of fresh air to operators working above and at floor level, while operators in pits are supplied with washed and filtered air by a special Mahon Air Supply System. Hydro-Filter System exhausts all fumes and overspray and assures complete firesafety.

THE R. C. MAHON COMPANY
DETROIT CHICAGO

North American P-51 with Camouflage Pattern
(U. S. Army Air Forces Photo)

Feathering the War Birds

By JEFFREY R. STEWART

The author of this article has selected a representative group of actual problems which have been encountered in the finishing of military aircraft and presents here, in the popular "quiz" form, the answers to questions which have puzzled those in charge of finishing departments as much as the camouflaged plane shown above will puzzle our enemies.

SINCE the type of metal to be finished is an important factor in the selection of a protective coating, can you supply any information regarding the composition of the aluminum alloys used in aircraft construction?

The most extensively used aluminum alloy used is known as Type 24-S. It has the following composition:

Aluminum . . 93.4 per cent minimum
Copper . . . . 4.5 per cent
Manganese . . 0.6 per cent
Magnesium . . 1.5 per cent

This alloy is only slightly heavier than pure aluminum. In the soft or annealed state, it is only slightly stronger, but after suitable heat treatment physical properties develop which make it somewhat stronger than low carbon steel. The heat treatment, however, does not materially affect the adhesion of the paint film.

Is it necessary to paint all the exposed parts of an airplane?

Yes, it is necessary not only from the standpoint of appearance, but also to protect the aluminum alloy from corrosion and for camouflage purposes. Even such seemingly unimportant parts as the aerial gunner's seat, the instrument panels, gun sights, and so on, are carefully protected with paint. The wooden parts are also painted, but the plastic sections are left uncoated.

Are the planes all painted as a unit after they have been consructed, or are the individual parts painted before they are assembled?

The plane parts are painted with a primer almost immediately after being made, whether they are to be installed in the aircraft or are to be placed in storage for future use. Since approximately 75 per cent of the aircraft is made from flat sheets, it has sometimes been found an aid to production speed to accumulate a backlog of parts which have been manufactured, painted with primer and placed in storage for future use.

What colors are now being used to paint our Army planes?

Until recently olive drab has been the most prominent color. However, an increasingly larger number of planes are now painted in the various camouflage colors which have been established as official standards by the Ordnance Department of the U. S. Army.

There are several types of primers available for painting aluminum alloys. What type is used on most of the military aircraft in United States?

The most widely used primer is based on zinc chromate as the corrosion inhibitor.

It has been rumored that the aircraft inspectors at some of the bomber plants classify planes into two categories; i.e., those which are perfect in every respect for use by the Americans, and those which have slight and unimportant defects (such as an imperfect spray job) for use by our Allies to be sent to them under the lend-lease agreement. Is this true?

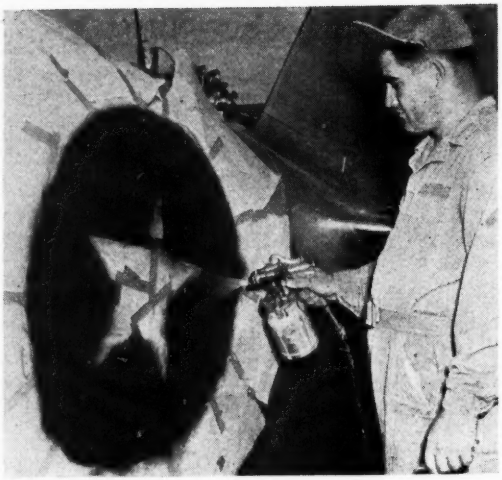
No. The same care is shown in inspection of our own planes and of those for our Allies.

Explain briefly how the airplanes are painted.

In most bomber plants, the individual parts are painted first with the primer coat and after these parts are assembled, the top coats are applied. The smaller parts of the plane are moved along an automatic conveyor belt and are sprayed with an automatic spray gun. This is done in shuttle-like fashion in a water-wash spray booth. The object in using the water-wash type of spray booth is to collect the overspray and also to absorb the odor. The only thinner that is permitted is one recommended by the manufacturer of the aircraft finish. After the small parts have been coated, they are automatically conveyed into a tunnel which contains a slow blast of warm and dry air. By speeding up the evaporation of the solvent in this manner, earlier handling is made possible.

Does the paint inspector rely on scientific instruments in his inspection, or does he rely on his own visual examination?

In general, if the finish looks satisfactory to the trained eye of the inspector, it is approved by him. Very few scientific instruments are used to



A member of the ground crew of the Army Air Forces is shown here spraying the blue circle which is part of official insignia on all U. S. planes. The white star which occupies the center of the circle is masked out while the blue paint is applied.

(U. S. Army Air Forces Photo)

test the finish of the plane after it has been painted. Since the paints have already been tested and evaluated both by the manufacturer and by the laboratory in the bomber plant, it is not usually necessary to make a third scientific examination. The final examination and approval is made by an experienced paint inspector merely by his human visual means. In the event that the inspector rejects any of the aircraft parts as being unsuitably finished, the object is sent back to the cleaning department, the finish is removed, and the metal is again painted in the usual manner.

What is a "log?"

A log is another name for a "work slip." It is a piece of cardboard or heavy paper which is printed in such tabular form that the various operators will know what to do to that particular part of the plane. It accompanies the part in its travel through the finishing plant, and designates such things as the kind of paint to be used, the number of coats to be applied, and so on.

Are brushes ever used to replace spray guns?

Yes, but only in very rare cases. A spray gun is usually employed on metal and wood parts, and a brush is considered the best means of applying paint to the various fabrics used in the plane. In some instances the dipping method is employed.

How are the extremely small parts of the plane finished?

These are finished by placing them on trays about two and one-half feet square and then coating them by the use of spray gun. After they have dried, they are inverted and the other side is coated. Automatic conveyor belts are not used in connection with the extremely small parts, as is the case with the medium-sized parts.

When an airplane is passing along the assembly line, how can the inspector tell whether the plane is to be used by Americans or is to be sent to the British or any of the other Allies?

There is no sure way to make this distinction. However, in general, the British planes are anodized, whereas this treatment is not ordinarily given to the American planes.

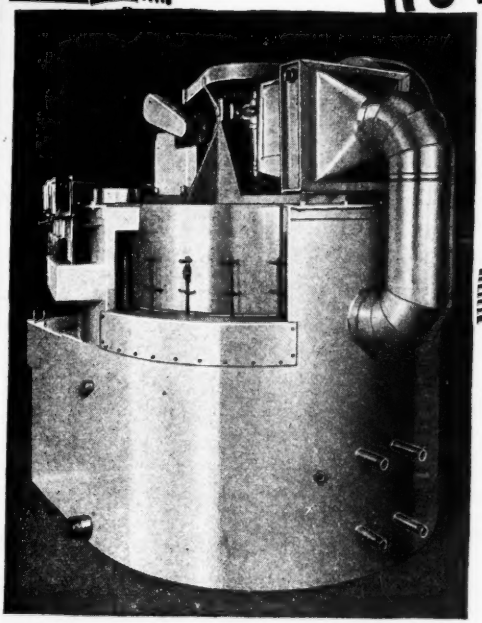
What is meant by an anodized finish?

Anodizing is a treatment of aluminum or aluminum alloy which is effected by placing the parts in a steel container which holds a solution of chromic acid, CrO_3 (chromium trioxide). The container is then made the cathode and the aluminum parts made the anode by connection to a direct current supply. The acid reacts on the negatively charged aluminum parts to form a hard surface film of aluminum oxide. This film acts both

DO A BIG DAY'S WORK IN A SPACE ONLY 7' 6" x 6' 6"

Ransohoff ROTOMATIC

WASH · RINSE · DRY Machine For Cleaning Metal Parts



A CLEANING MACHINE in which work revolves. Simple and economical . . . efficient, swift, thorough.

1. **Hang work on fixtures.**
2. **Work is cleaned in a series of pivoted rotating baskets, loaded and unloaded automatically.**
3. **Put work in removable baskets placed on a revolving table.**

NOTE: All bearings and the driving mechanism are mounted on top of the machine and do not come in contact with the cleaning solution.

Write the RANSOHOFF ENGINEERS for information.

N. RANSOHOFF, Inc.

1311 TOWNSHIP AVE.

CINCINNATI, OHIO

as a protective coating and also as an excellent paint base. The usual procedure requires an application of approximately 40 volts for a period of 30 minutes. The film is soft and jelly-like when first formed, but is partially "set" by a hot water rinse.

When anodizing rivets for airplane parts, sulfuric acid usually replaces chromic acid. The sealing treatment is made with the use of boiling potassium or sodium dichromate solution. Anodizing cannot be done on aluminum alloys which contain more than five per cent of copper, nor on assemblies containing metal parts not made largely of aluminum.

What is "chromodizing?" How does it differ from anodizing?

This is a method of treating metal in which the object is dipped in a five per cent solution of chromic acid at 140 deg. F. for two to five minutes. This method is permitted as a substitute for anodizing in many bomber plants, providing it is used on non-heat-treatable alloys and metal No. 53-S.

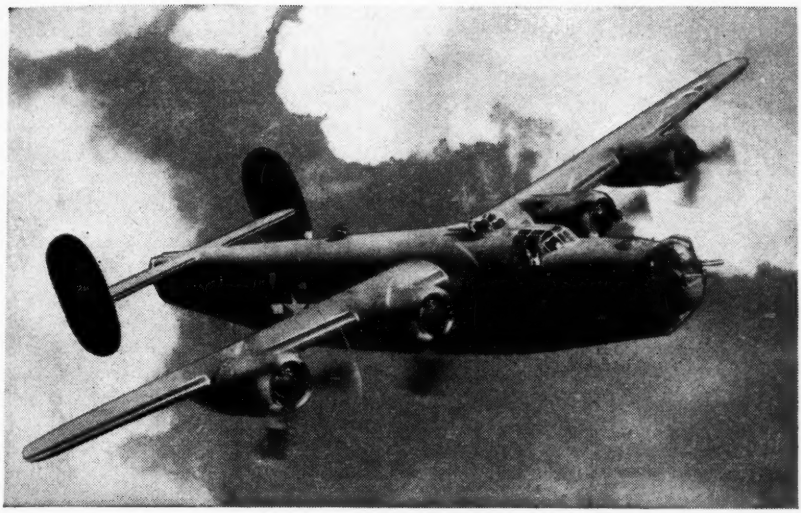
What is "Alclad?"

This is sheet aluminum alloy "Dural" with a thin coat of pure aluminum on both sides. The purpose of the thin aluminum film is to protect the "Dural' and prevent corrosion. This method of protection is satisfactory so long as the pure aluminum layer remains.

How are the different types of metals identified?

Instead of using numbers or letters, as in the case in many assembly plants, the more modern method is to use various colors as a means of identification. The reason for this is that

Employees of the Laister-Kauffman glider plant spray wing dope and stencil the Army Air Forces insignia on the wings for the first production line model of the TG-4A glider.
(U. S. Army Air Forces Photo)



Chemically Clean Surfaces for Lasting Metal Finishes

Deoxidine method is adapted to cleaning all aluminum, aluminum alloys, steel or other metals (except zinc or cadmium).

Today it is more essential than ever before that aluminum and other metal parts used in construction of aircraft, automotive vehicles and other fighting equipment should be *chemically clean* before the protective finish is applied—else damage from oxides and rust may cause irreparable damage.

There are various grades of Deoxidine suited to the several methods of application and to cleaning where varying amounts of oxides, rust, scale and oil are present.

Our technicians are available to adapt Deoxidine or other ACP Products to your individual production problems. Time will be saved if you will give us as complete details as possible concerning your methods and requirements.

Manufacturers of Inhibitors & Metal Working Chemicals

AMERICAN CHEMICAL PAINT CO.

AMBLER ACP **PENNA.**

Note — West Coast Plants may address inquiries and orders for prompt delivery to Leon Finch, Ltd., 728 East 59th St., Los Angeles, California

AMERICAN CHEMICAL PAINT COMPANY, AMBLER, PA.

Please send me general Technical Service Data Sheets on

☐ *Deoxidine #170*

Name_____ Title_____

Company_____

Address_____

A-1

a workman or operator can remember a color or a combination of colors better than he can a series of numbers or letters. All of the sheet steel, bars, rods and tubing used in bomber plants have the same general appearance. To avoid confusion by the use of colors, stripes are utilized. By this means, the exact composition of the metal can be determined. The various colors of paint used and their respective code numbers have been published in the Aircraft Workers' Manual of the Fletcher Aircraft Training System.

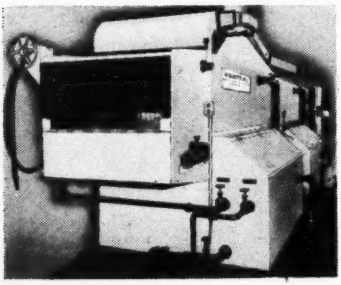
As you probably know, many metallic castings are rejected due to the fact that a porous condition exists which cannot be satisfactorily masked by the use of enamel or lacquer. We have heard that there is a new method of eliminating this wartime waste, but we do not have the details. Can you give any information on this subject?

You are probably referring to the new process for sealing porous castings by the plastic method. This was originated in England and has been adopted by some American plants. The method consists essentially in impregnating the metallic casting with a solution of a plastic resin under pressure. This is followed by heat treatment to effect polymerization, after which any excess resinous material is removed by abrasive action.

In many plants producing military airplanes, the so-called "shop coat" is applied. Please explain the function of this special type of coating.

This is a new and interesting development used in military planes in conjunction with the "skins." The skins can be compared to the thin and invisible film of aluminum oxide which protects the entire surface of the aluminum kettle in your kitchen. Most of us realize that if this film were removed, the aluminum would probably develop faults such as small

INDUSTRIAL WASHING MACHINES



. . for fast and efficient cleaning of vital parts!

Automatic washing and cleansing have become as integral a part of production and repair as the lathe or drill press. Faster production, higher product quality and manpower economy have resulted.

INDUSTRIAL units are completely self-contained and utilize a minimum of floor space. Each is applicable to washing, cleansing, rinsing, dipping, slushing or drying operations or any combination thereof.

WRITE FOR ILLUSTRATED CATALOG

INDUSTRIAL WASHING MACHINE CORPORATION

290 BURNET ST. NEW BRUNSWICK, NEW JERSEY

TRUE OR FALSE?

All Black Oxidizing Processes for steel are the same

FALSE!

All Black Oxidizing Processes for steel are NOT the same

The Oxidizing Salts are Different

The Procedure is Different

The Results are Different

IF YOU are not getting the results that you should with the black oxidizing process that you are using, it will pay you to call on Du-Lite. Our engineers are specialists in solving the problems of black finishing steel.

Or if you are planning to use a black oxide finish for the first time, Du-Lite will study your individual problem, and make recommendations.

Why not take advantage of the service of specialists? Wire or write Du-Lite today for prompt attention.

DU-LITE CHEMICAL CORP.

Specialists in Black Oxide Finishes for Steel Parts

Middletown, Connecticut

pin holes. Such a fault is not nearly so tragic in the kitchen as it would be to the skin of our warplanes. Therefore, the aluminum alloys which are used in airplane construction are coated with a thin coating of pure aluminum oxide, known as the "skin." This is applied to the surface with the aid of heat and pressure. After the formation of the skin, it can easily be damaged through handling. For this reason a "shop coat" is applied, which is later removed before the plane is painted. This special coating is usually composed of a quick-drying lacquer in which the adhesion is purposely made so poor that removal can be easily effected.

With regard to camouflage paints for planes, what would you say are the chief requirements which should be considered when an industrial finishing plant buys large amounts of this material from a paint manufacturer?

The requirements of camouflage paints are, in general, proper color, a lustreless finish, sufficient hiding power to enable a one-coat finish, and low cost. Since the paints may be used in war zones by inexperienced labor, as well as by a professional spray mechanic in the industrial finishing plant, it is important that the material be easy to apply in such a way that one coat will suffice. The durability (weather resistance) and color retention (freedom from fading) are important, and the paint should withstand at least six months' normal exposure to the natural elements or 300 hours exposure to the carbon arc lamp of the Weatherometer. A lustreless finish is not only desirable, but essential in order to eliminate specular reflections and to attain the right kind of blending for camouflage work.

Aluminum Paint

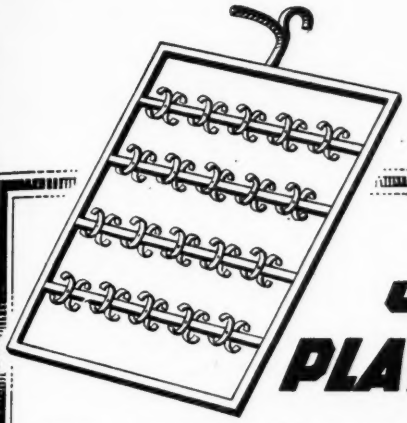
THE War Production Board on December 24th relaxed restrictions on aluminum paint, with the issuance of Supplementary Order M-1-g, as amended. The amended order sets up seven permitted uses of aluminum paint for the purchase of which no approval is needed.

The amended order forbids the sale of aluminum pigment in amounts of more than two pounds, and of aluminum paint and ink in amounts in excess of one gallon, to anyone who cannot give a rating of AA-5 or higher. This will permit retailers to dispose of their present stocks, if any, in small quantities, to printing shops which are allowed to use it in printing and lithography and to individuals whose use of the material is not restricted; but it will prevent retailers from replenishing such stocks except against sales for uses carrying an AA-5.

Steel Shipping Drums

THE War Production Board has advised all manufacturers of paint, varnish and lacquer, through the National Paint, Varnish and Lacquer Association, to make certain that the best possible use is made of their present supply of steel shipping drums. The WPB Chemicals Division has pointed out that the supply of steel for shipping containers is so limited there is no assurance that sufficient steel containers for packaging all protective coatings required by the armed services will be available.

It is essential that paint, varnish and lacquer manufacturers obtain the cooperation of their customers so that steel drums may be returned wherever possible and re-used as many times as possible. In this way, it is hoped that paint, varnish and lacquer manufacturers and their customers may obtain necessary supplies of drums.



JUST A PLATING RACK

Perhaps to many, this is just another plating rack.
But, to the modern plater, it's more than just a plating rack,—it's a means for increasing production, improving quality and lowering costs.
Back in the days when only a few pieces of this or that were to be plated, the work was hung on wires and, while the finished job was good enough, it was a slow and costly process.
Then, along with other modern production methods, came the use of racks or fixtures to hold the parts to be plated or anodized and which were usually designed to fit the job. The result has been increased production, uniformly better work and lower costs.
The cost of such racks and fixtures, many of them cleverly designed, is small compared to the saving in labor, the increased volume, and the production prices their use made possible. Without them the present vast output of plated and anodized parts and units in war production would have been impossible.
Rack INSULATION is equally important: it must be a good dielectric to eliminate current loss; it must have excellent chemical resistance to acids, alkalies and hot cleaners; it must have good adhesion to the rack so that it will stand up for hundreds of cycles through the tanks. By avoiding current loss, preventing shading, reducing or eliminating spoilage and making racks last indefinitely, good rack insulation such as BUNATOL still further improves production and reduces costs.
BUNATOL is the accepted rack insulation in hundreds of plants because it is the dependable, long-life, low-cost insulation for all plating and anodizing solutions.
In making your post-war plans, you should have latest information on BUNATOL RACK INSULATION. A letter will bring this information and samples if required. Put our more than eight years' experience in the EXCLUSIVE manufacture of Insulation and Stop-Off for use in electro-plating and anodizing to work for you.

NELSON J. QUINN COMPANY, Toledo 7, Ohio

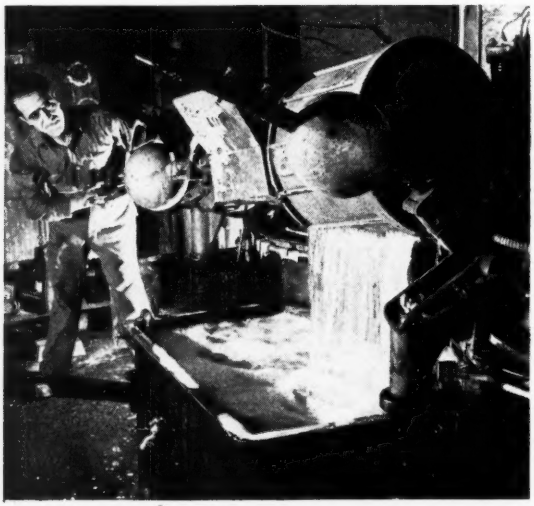
BUNATOL
ENGINEERED INSULATION

New Plating Process for Aircraft Instruments

CERTAIN copper or brass parts of aircraft instruments that carry high-frequency currents must be corrosion-resistant. Electrically, they must have surface conductivity because of high-frequency current skin effect. Nickel, normally used to provide anti-corrosion protection, has high electrical resistance. In seeking a solution to this problem, Westinghouse engineers turned to gold, which is non-corrosive, satisfactorily conducting, but too costly.

Electrochemists finally evolved an answer that disposed of this particular worry and provided a plating technique valuable in many applications unrelated to the original need. Special plating anodes are made of an alloy of copper, tin and zinc. With these soluble anodes, copper and brass parts are being plated, using standard plating practices.

The results are said by Westinghouse engineers to be truly amazing. The plated surface has the necessary electrical conductivity for high-frequency applications and also the required corrosion resistance. Further, the finish is mirror-like, being surpassed in this respect only by silver itself. The new plating is entirely non-magnetic and is easily soldered, a valuable characteristic in many electrical applications. Furthermore, the new process has excellent "throwing power"; in other words, deep interior surfaces in objects with cavities are plated uniformly.



The operator is manipulating the machine that applies the new type of plating. Westinghouse engineers say that the new plate has a mirror-like finish, is corrosion-resistant and has high electrical surface conductivity.

Industrial Gloves. Edmont Manufacturing Co., Coshocton, Ohio, has issued a bulletin covering the various types of Edmont rubberized fabric industrial gloves made by this company. Synthetic "7" gloves are said to have exceptionally high resistance to oil, grease and all petroleum solvents, as well as acids, caustics and corrosive chemicals. Neoprene coated gloves are recommended for those uses which require high resistance to heat. Copy of the bulletin upon request.

POST WAR PLANNING AT HOME

Don't wait until the whistle blows! Now is the time to learn about the faster acting, harder hitting compounds for cleaning that have been developed in MAC DERMID INCORPORATED laboratories for post war products. Write today, a MAC DERMID INCORPORATED service engineer will be pleased to explain the various formulations that are now available.

EQUIPMENT

In addition to manufacturing over fifty different compounds for every metal and alloy, MAC DERMID INCORPORATED represent several of this country's leading equipment manufacturers; are the New England distributors for The Udylite Corp. plating equipment. Let us help you with all of your finishing room problems; give you the benefit of our twenty years service to others.

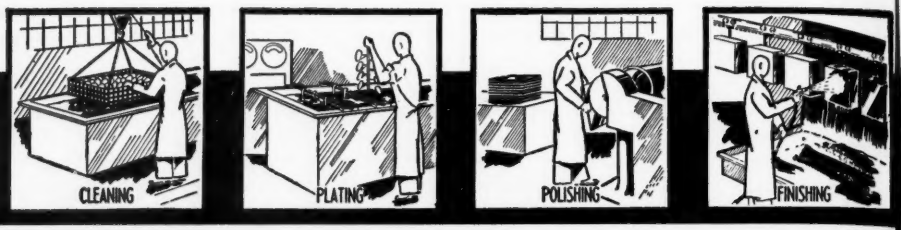
MAC DERMID

INCORPORATED

WATERBURY 88, CONNECTICUT

WRITE ONE OF THESE SERVICE ORGANIZATIONS FOR FREE DEMONSTRATION

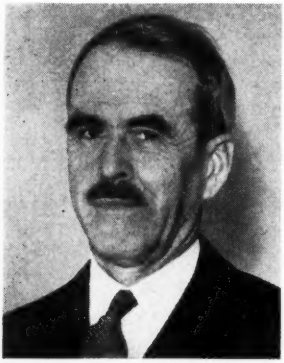
NEW YORK	DETROIT	CHICAGO	LOS ANGELES	CLEVELAND	ST. LOUIS	TORONTO—CAN.
Udylite Corp. (L. I. City)	Udylite Corp. Wagner Bro.	Udylite Corp. Geo. A. Stutz Mfg. Co.	Nobs Chemical Co.	Udylite Corp McGean Chem. Co.	LaSalco, Incorporated	Clark Industrial Supplies Co.



News of the Industry

MacGregor New General Manager of DuPont Electrochemicals Department

The appointment of Frank Sanderson MacGregor as general manager of the Electrochemicals Department was announced recently by E. I. du Pont de Nemours and Company. The appointment became effective January 1, 1944, when Mr. MacGregor, since February, 1942, assistant general manager of the department, succeeded Dr. E. A. Rykenboer, who retired December 31 on account of ill health.



Frank Sanderson MacGregor

Mr. MacGregor joined the Du Pont Company in 1916, becoming successively assistant director of the Development Department, where he helped to lay the foundation for the company's expansion from the explosives into the diversified chemicals field; control manager of the former paint department, in 1922; assistant director of the Development Department, 1923 to 1928, serving also as managing director of the Hotel Du Pont Company from 1926 to 1928.

He was general manager of the Acele Department of the former Du Pont Rayon Company, 1928 to 1934; president and general manager of Ducilo S. A. Productora de Rayon, Du Pont affiliate in Buenos Aires, 1934 to 1939; served on special assignment from 1939 to 1941, becoming director of the company's priorities division in June that year.

Quaker Chemical Appoints Sturm

Quaker Chemical Products Corporation, Conshohocken, Pa., announces the addition of Harry J. Sturm to the Administrative Department staff. He is a graduate of the University of the South, Swannee, Tenn., with the degree of B.S. in Economics. Mr. Sturm is a veteran of World War II and has been honorably discharged after having served in the Army of the United States from October 2, 1941 to September 7, 1943. As a second lieutenant, Infantry, he was a member of the forces that invaded Africa and saw action in Tobruch and Tunis.

A.E.S. 1944 Convention

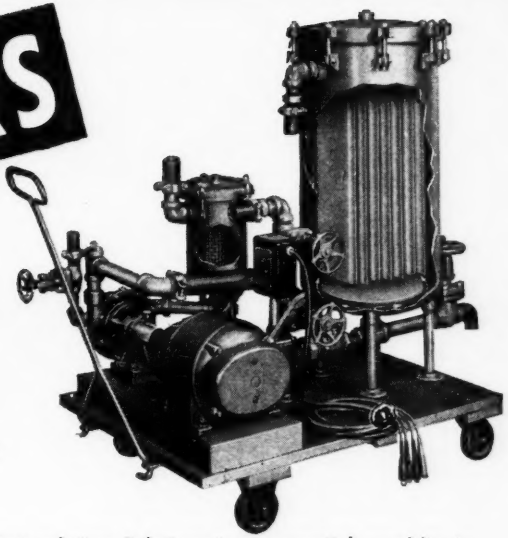
A bulletin from the Cleveland Branch of the American Electroplaters' Society stresses the point that it is not too early

FILTERS

for

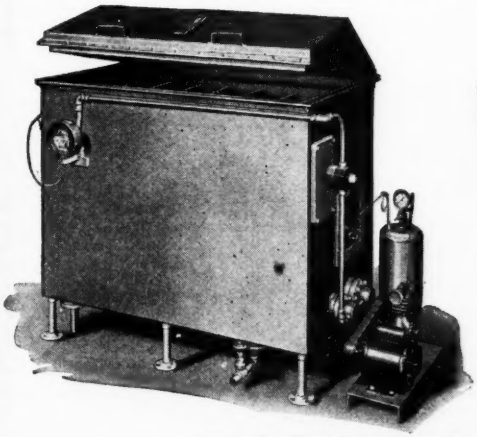
ELECTROPLATING SOLUTIONS

Degreasing Solvents
Industrial Oils
Coolants, Cleaners, Etc.



Filtration and Purification of Electroplating Solutions is an essential requisite to produce ***Quality*** plating.

Industrial Filters are built with ***larger*** filter areas, ***more*** sludge holding capacity, and are provided with highly efficient pumps. Based on actual experience in hundreds of leading plants, our filters provide platers with the most practical and efficient means of keeping their solutions Pure and Clean.



SALT SPRAY CORROSION TEST EQUIPMENT

The modern way to test electroplating or coated metals is with Industrial corrosion test equipment. With this equipment you can pre-determine the quality of work being done, and avoid costly rejects and loss of time. Made in sizes to suit your needs with temperature controlled up to 130 Deg. Fah. Meets Army, Navy Aeronautical Specifications as outlined in Bulletin AN-QQ-S-91-S dated Dec. 1938, and Others.

Write for New literature and complete information.

INDUSTRIAL FILTER & PUMP MFG. CO.
1621 WEST CARROLL AVENUE • CHICAGO 12, ILLINOIS

to make plans to attend the 32nd Annual Conference on Electrodeposition and Metal Finishing which is to be held in Cleveland, Ohio, on June 12, 13 and 14, 1944. The members of the Cleveland Branch, who will be the hosts, are perfecting the program of educational and events. They urge you to mark the dates on your calendar so that you will be sure to attend this important conference where many worth-while papers and talks will be presented.

Westinghouse Names Ordnance Plant Manager

Appointment of James R. Weaver as manager of the Naval Ordnance Plant at Center Line, near Detroit, Mich., has been announced by F. D. Newbury, vice president of the Westinghouse Electric and Manufacturing Company. Mr. Weaver has been transferred to the Center Line plant from the Louisville plant where he had been manager since November, 1940. His successor as manager of the Louisville operation is C. E. Shiplet, formerly superintendent.

Mr. Weaver, a former president of the American Society of Tool Engineers, has

James R. Weaver

held a number of positions in the Westinghouse organization, including works mechanical engineer, assistant superintendent of equipment, superintendent of manufacturing equipment, works equipment director, and in 1939 he was named director of equipment, inspection and tests. He held this position until his appointment in 1940 as manager of the U. S. Naval Ordnance Plant at Louisville.

C. E. Shiplet, who succeeds Mr. Weaver at the Louisville plant, attended Iowa State College. He joined Westing-

C. E. Shiplet

house in 1907 as a draftsman in the steam engine division of the Westinghouse Machine Company. For 15 years he was a designer and engineer with the Farm Machinery Manufacturing Company, returning in 1924 as general foreman of the Mansfield (Ohio) Works of the Westinghouse Electric and Manufacturing Company. Before his transfer to Louisville, Mr. Shiplet had been promoted to superintendent of tools and machining at Mansfield.

DeVilbiss Offers Four Training Sessions for Industrial Spray Painters

With finishing departments throughout industry bucking the handicaps of "too much work and not enough men," the DeVilbiss Company, Toledo, Ohio, has made a welcome announcement.

To train operators, beginners as well as veterans, in faster, more efficient finishing methods, DeVilbiss is opening to them four one-week sessions in the first half of its 1944 School of Spray Painting to be held at its plant in Toledo. All applicants using DeVilbiss equipment on their jobs will be admitted free to any of these sessions which begin January 10, February 14, April 16 and May 15.

All four sessions will cover the same

STARTING JANUARY 18th
IT'S UP TO YOU!

STARTING January 18th, it's up to you to lead the men and women working in your plant to do themselves proud by helping to put over the 4th War Loan.

Your Government picks you for this job because you are better fitted than anyone else to know what your employees can and should do—and you're their natural leader. This time, your Government asks your plant to meet a definite quota—and to break it, *plenty!*

If your plant quota has not yet been set, get in immediate touch with your State Chairman of the War Finance Committee.

To meet your plant quota will mean that you will have to hold your present Pay-Roll Deduction Plan payments at their peak figure—*and then get at least an average of one EXTRA $100 bond from every worker!*

That's where your leadership comes in—and the leadership of every one of your associates, from plant superintendent to foreman! It's your job to see that your fellow workers are sold the finest investment in the world. To see that they buy their share of tomorrow—their share of Victory!

That won't prove difficult, if you organize for it. Set up your own campaign right now—and don't aim for anything less than a 100% record in those *extra* $100 bonds!

And here's one last thought. Forget you ever heard of "10%" as a measure of a reasonable investment in War Bonds under the Pay-Roll Deduction Plan. Today, thousands of families that formerly depended upon a single wage earner now enjoy the earnings of several. In such cases, 10% or 15% represents but a paltry fraction of an investment which should reach 25%, 50%, or more!

Now then—Up and At Them!

Keep Backing the Attack!—WITH WAR BONDS

This space contributed to Victory by PRODUCTS FINISHING

This advertisement prepared under the auspices of the United States Treasury Department and the War Advertising Council

ground with classroom instruction and shop work conducted by spray painting experts. For further information and reservations, companies and individuals should write the DeVilbiss Company, Toledo 1, Ohio.

Army-Navy "E" Award to Yale & Towne

The Army-Navy "E" flag now flies over the plant of the Philadelphia Division of the Yale & Towne Manufacturing Company, producer of materials handling machinery. All branches of the

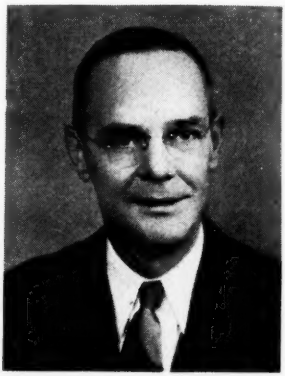
The "E" award flag is unfurled by J. C. Morgan and Henry S. Walters as President Carey, Lt. Colonel Purchell and Lt. Lapres look on.

armed forces use Y & T hand and electric hoists, hand lift and electric trucks to speed the lifting and transporting of goods and war materials in plants, warehouses, depots, aboard ship and on the field.

At the presentation of the award Mr. W. Gibson Carey, Jr., president, James C. Morgan, general manager, and employee representatives were on the platform to receive the citation and "E" insignia.

H. S. Tweedy Appointed Detrex Service Manager

W. W. Davidson, vice president of Detrex Corporation, Detroit 27, Mich., announces the appointment of Harry S. Tweedy as manager, Field Service Division. Mr. Tweedy has been chief inspector of production in all Detrex plants since December, 1940. Prior to that time,



H. S. Tweedy

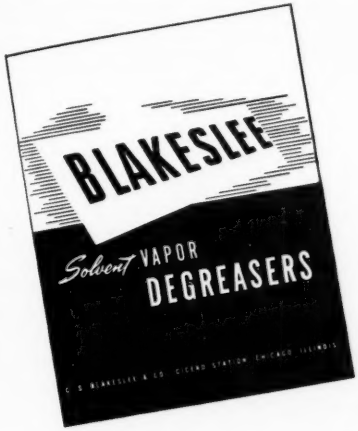
he served for four years as a design engineer.

Dr. Baum Heads Turco Organic Research Laboratory

To keep pace with new problems in the metal industries, an organic research laboratory has been opened in the Turco

Dr. Nathaniel Baum

Los Angeles laboratory, according to S. G. Thornbury, president of Turco Products, Inc., 6135 S. Central Ave., Los Angeles 1, California. Dr. Nathaniel Baum has been appointed head of the new department.



To help You Solve Your Problems

● A new catalog on Blakeslee Degreasers. A 24-page book describing these fast, efficient degreasers, the many standard and special applications and the reasons Blakeslee Degreasers are the most economical in operation.

Write for a FREE Copy Today!

G. S. BLAKESLEE & CO.

NEW YORK — CICERO STATION CHICAGO — TORONTO

Do You Fear Inspection?

You don't need to, if your plating solutions are filtered by

SPARKLER

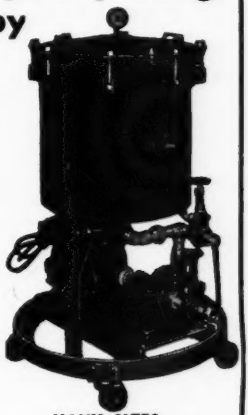
HORIZONTAL PLATE FILTERS

BECAUSE—filtering the Sparkler way gets rid of all the "bugs," sediment and grit in your solutions, assuring the highest polish.

Sparkler filters are readily adaptable to all filtering media—carbons, earths, pads or paper. It has been proved that heavier filter cake can be built up and retained on a horizontal plane—*the natural way*—than by any other method, resulting in longer filtering cycles and faster flow rates.

Sparkler filters are flexible and dependable, always doing uniform, high quality work. Compact and convenient machines, easy to clean and handle.

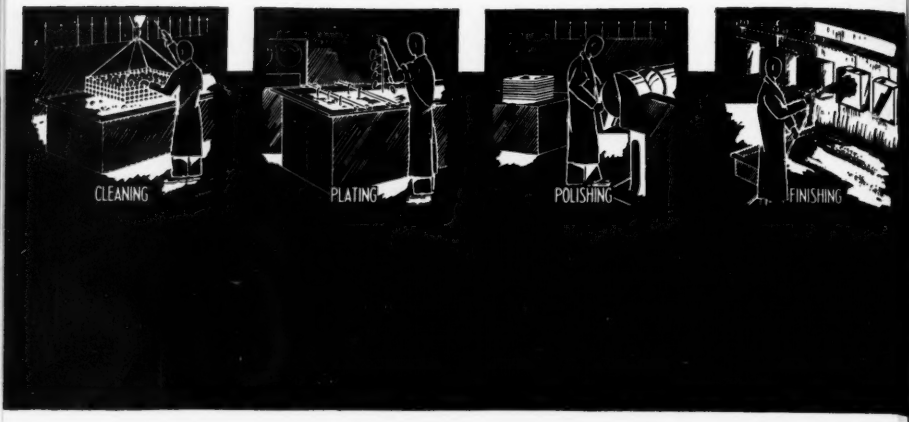
Write for a Sparkler engineer—no obligation—or any special details.



MANY SIZES—
50 to 10,000 G.P.H.

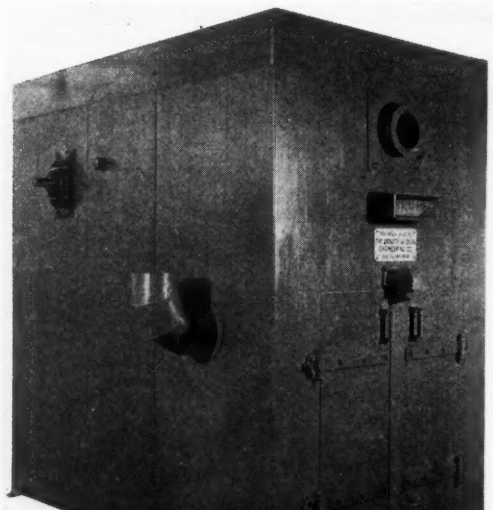
SPARKLER MANUFACTURING COMPANY

255 LAKE STREET — MUNDELEIN, ILLINOIS



"Industrial" Standard Box-Type Oven

The Industrial Oven Engineering Company, 11621 Detroit Ave., Cleveland, Ohio, is now producing a standard box-type oven in several standard sizes for a variety of batch heating purposes. It uses any commercial oven fuel including electricity. Door sizes range from 3 ft. wide by 5 ft. high, to 5 ft. wide by 7 ft. high, with working depths from 4 to 10 feet.



"Industrial" Standard Box-Type Oven

Heating equipment is built into the oven shell and the oven is shipped assembled, ready to operate except for the attachment of accessories. Duct-work is likewise built in and is arranged for cross flow and vertical air passage, affording positive and rapid circulation through a relatively dense work load. Recirculation and exhaust ducts are arranged to prevent belching or leaking at the door opening.

One of the principal features of the series is close temperature tolerance within limits from 200 to 1,000 deg. F. On high-temperature units, the inside panels are made of steel plates with heat-affected parts of chrome and chrome-nickel alloys. Ovens can be furnished with or without positive exhaust fan systems, depending on the processes for which they are to be used.

Standard temperature controls are expansion recording thermometer type or millivoltmeter type, depending on the accuracy of control required. Full electric safety equipment protects the system against flame, current or air failure.

The ovens can be used with trucks or racks for steel strip dehydrogenizing, aluminum

heat treating, stress relieving of N.E. alloys, metal finishing, curing of synthetic resins, tempering and blueing of steel parts, and a number of other miscellaneous applications.

"Vescote"

A non-organic coating for coating metal known under the trade name "Vescote" is claimed to have advantages as a protection against corrosion. It can be applied to both non-ferrous metals or iron and steel. The manufacturer claims that Vescote, when properly applied, will overcome cracking, flaking, peeling and distintegration of the coating.

Acording to the makers, Vescote is a siliceous coating closely related to vitreous enamel, which will bake at a lower temperature. It is hard and abrasive resistant and takes on an appearance resembling dull glass. It can be applied with a spray gun, dipped, or by brush. Spraying, however, provides the best appearance.

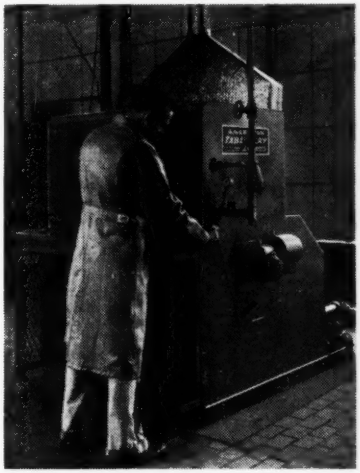
After applying Vescote to the metal surface, it is baked in an oven with a temperature of 350 to 450 deg. F. either by convection or infra-red ray heating. It is stated that Vescote will easily stand temperatures up to 1,000 deg F., and under no condition will it burn. Vescote is manufactured by Vesco Corporation, 1395 Sedwick Ave., New York 52, N. Y.

American Tabl-Spray Metal Washing Machine

Designed to meet the need for high speed washing of flat, fragile work or circular parts with intricate pockets and crevices, the Tabl-Spray metal washing machine has been developed by American Foundry Equipment, 555 S. Byrkit St., Mishawaka, Ind. By reason of the completeness of the exposure given the parts in rotating them through the path of well-positioned power sprays, the unit is said to insure uniform coverage and thorough speed cleaning.

Parts to be cleaned in the Tabl-Spray are placed on the mesh table and rotated through the spray solution, discharged from special machined non-clogging nozzles. After the few minutes of required washing time, the solution valve is closed and the parts are left rotating to obtain proper drainage. If rinsing with fresh water is desirable, this operation can be handled without transferring parts to another compartment by means of a special arrangement of drainplates. A compressed air blowoff can follow the cleaning to remove excess liquid from the parts.

A system of straining devices placed in the path of the recirculated cleaning solution settles out all chips or foreign matter. The spray system is easily removable for cleaning and is fully acces



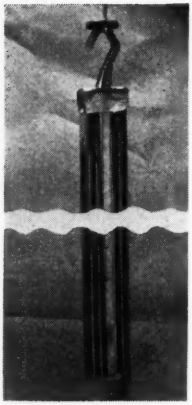
American Tabl-Spray Metal Washing Machine

sible for adjustment. The Tabl-Spray operates equally well with either an alkali washing solution or with a solvent emulsion.

Parts measuring 25 in. in diameter and 12 in. high can be handled on the standard Tabl-Spray. Machines with 30 and 42-in. diameter tables for larger sized work are also available. Typical cleaning application of the Tabl-Spray include removing lapping compound, oil and chips from magnesium and aluminum aircraft parts, cleaning crankcases, supercharger rear housings and adapters, small assemblies, gears, rocker arms prior to inspection or after magnaflux.

Heil Sawtooth Lead Anode

A sawtooth lead anode for electroplating has been developed by the Heil Engineering Company, 12901 Elmwood Ave., Cleveland, Ohio. It differs from the standard flat anode in several ways. The multi-angled surface provides increased area, and the multiple edges are



Heil Sawtooth Lead Anode

said to increase the anode's effectiveness when used between two work rods.

One side of the anode has 10 edges and the other side has a central spine a half inch thick running down the center. This spine connects directly with the hook, thus insuring long anode life and providing increased current-carrying capacity from top to bottom. It is claimed that the angular construction lends rigidity and offers resistance to buckling or warping.

The anodes are made of extruded lead. The hooks are coated and integrally bonded to the anode to provide a continuous metal conductor. Five standard hook styles are available, designed for varying uses of anodes, and special hooks may be had on request.

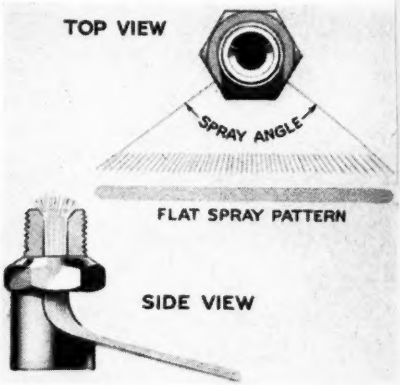
Klarifiant

For use in the waterwash curtain of paint spray booths, The DuBois Company, Cincinnati 3, Ohio, has developed a product known as "Klarifiant." It is claimed that Klarifiant peptizes paint and lacquer residues, prevents damming of lines, and imparts a self-scouring action to the solution so that the metal surfaces in lines and pumps, as well as on the backboard and in the reservoir, are kept brightly clean.

An additional advantage is that Klarifiant is adapted to do its job practically as well in hard calcium and magnesium waters as in soft or softened waters.

Flooding Nozzle

Wherever an exceptionally wide flat spray is required, a flooding nozzle developed by Spraying Systems Company, 4021 Lake St., Chicago, Ill., is said to prove extremely useful. Designed for use in spraying eliminator plates and similar applications, the flooding nozzle is available in brass and other standard materials.



Flooding Nozzle

The surfaces of the nozzle which make contact with the liquid sprayed are finely finished. The curved areas have been designed to produce the desired spray in an efficient manner. A very wide angle spray may be obtained.

EDMONT
INDUSTRIAL GLOVES
Acid-Caustic-Oil PROOF
Synthetic Rubber Coating. Fabric Reinforced Lining
for MEN and WOMEN
EDMONT MFG. CO.
509 Orange St., Coshocton, O.

For a real good polishing job use
KEYSTONE EMERY
TURKISH — NAXOS — AMERICAN
KEYSTONE EMERY MILLS Write for Sample 4316 Paul St., Phila., Pa.

SPEED UP PRODUCTION!

Don't let a deburring problem lick you and slow up your production.

Consult a specialist in the field who is equipped to work out your problem.

Write today to:

LUPOMATIC TUMBLING MACHINE CO., INC.
4510 BULLARD AVE. BRONX, N. Y.

CUT DOWN REJECTS WITH ORVUS IN YOUR METAL CLEANING BATHS

This sulfated fatty alcohol Cleansing Agent is EFFECTIVE
—as a surface tension lowering agent
—as an emulsifier
—in dispersing lime soaps which might cause poor plating results if permitted to deposit on the metal

Write for further information about Orvus to

PROCTER & GAMBLE, Cincinnati, Ohio

for Many Reasons

The Modern Plating Room has Adopted ROBINSON'S Assayed Gold Plating Solution

SOLD BY WEIGHT (TROY) 100%
ADD WATER ONLY
INVESTIGATE!

Developed and Sold by

A. ROBINSON & SON

Refiners of Precious Metals
Gold, Platinum, Silver, Rhodium
For all Industrial and Scientific Uses

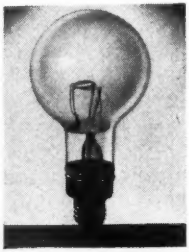
FOUNDED 1879

131 CANAL STREET NEW YORK CITY, N. Y.

DR. C. B. F. YOUNG, *Consulting Chemist*
F. J. DAVIS, *Installation Engineer*

Superlok Construction for Infra-Red Lamps

Birdseye Division of Wabash Appliance Corp., 345 Carroll St., Brooklyn, N. Y., has announced an innovation in the design of Birdseye infra-red lamps—Superlok construction for permanently locking the base and bulb against the extremely high temperatures of infra-red tunnels.



Birdseye Infra-Red Lamp with Superlok Construction

The Superlok construction employs no cement or strap to lock the base and bulb. It includes a base lining made with special protrusions which fit tightly into indentations in the neck of the bulb and are locked in position by special crimping of the metal base. The result is a permanently sealed, locked base that is said to be impervious to heat. A ceramic heat reflector disc replaces the mica disc formerly used.

CSC Protector

A skin protector has been announced by the Commercial Solvents Corporation, 17 E. 42nd St., New York 17, N. Y. CSC Protector is non-sticky, white and greaseless. It is claimed that it will not irritate sensitive skin and has no drying effect even after long and continuous use. Women war workers find it helpful since it eliminates permanent griming and grease-staining of hands and nails. CSC Protector-coated hands leave no stains or smudges on tools, papers or metals.

CSC Protector is rubbed into hands and nails thoroughly before work is started. It guards the hands for four to five hours after application. When work has been completed, the user cleans his hands as usual. CSC Protector washes away, taking dirt and grime with it. It is available in eight-ounce jars and in the economy-size gallon jar.

Vulcalock Cement

Lifting of restrictions on its Vulcalock cement, so that anyone who can qualify under Rubber Restriction Order R-I can purchase and use the product, is announced by The B. F. Goodrich Company, Akron, Ohio. Vulcalock cement, developed in the company's laboratories, has been an important contribution to the art of bonding rubber to metals and has wide application in that field—in tank cars, pickling, plating and other tanks where rubber lining is essential to operation, as well as many other applications.

Koroseal Tape RX and Koralac RX Solution

Two products made from Koroseal for covering plating racks are announced by The B. F. Goodrich Company, Akron, Ohio. Koroseal is a plasticized polyvinyl chloride thermoplastic material. One product is known as Koroseal Tape RX, while the second is Koralac RX, a solution of Koroseal. In some applications the two are used together, with the tape being applied after the rack has been coated with the solution, while in other cases they may be used separately.

It is claimed that Koroseal Tape RX possesses good resistance to wear and abrasion, has excellent insulating properties and can be used for practically all kinds of plating service, since it has resistance to all plating solutions, including chromic, alkali and acid dips.

Goodrich Koroseal Tape RX

Length of service from a rack covered with Koroseal Tape RX depends on the physical use to which the rack is subjected and not upon chemical deterioration of the tape. Any shape or style of plating rack which can be covered with regular friction tape can use

Check in
In Cleveland it's the
HOTEL HOLLENDEN
In Columbus it's the
NEIL HOUSE

DeWITT OPERATED HOTELS

OTHER DeWITT HOTELS:
THE LANCASTER Lancaster, Ohio
THE BARON STEUBEN Corning, N.Y.

ROLOCK
PROCESSING CARRIERS
SET NEW STANDARDS IN HANDLING TIME

Built for the specific job, Rolock designed *Baskets, Crates, Racks, Trays, etc.* meet the demands of time and load studies, temperature and acid exposures, or simple efficiency for the duty performed. For instance, the coolant draining basket shown, which fits in a standard pail used to catch screw machine products.

Details on request.

ROLOCK, INC.
1400 Kings Highway East, Fairfield, Conn.

Cutting Corners
. . . . for Top Speed Production

Rounding corners or removing burrs by grinding or filing is too slow and costly to meet today's demands for speed and economy.

Barrel finishing has solved many such problems. Write to us about yours and send a few unfinished samples of your small, metal parts. We'll gladly tell you if they're adapted to finishing with Abbott barrels and materials.

The Abbott Ball Company
1060 New Britain Ave. • Hartford, Conn.

Koroseal Tape RX. Made in glossy black, the tape is supplied in one pound rolls, containing approximately 170 lineal feet, ¾ in. wide by 0.014 in. thick, with the tolerance on width plus or minus ⅛ in. and plus or minus 0.002 in. on thickness.

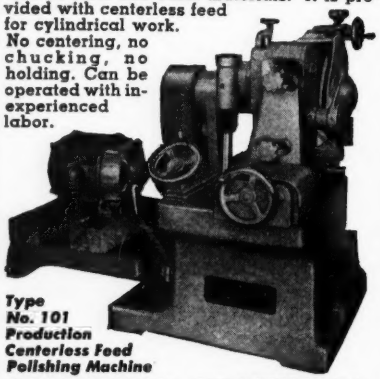
No special equipment is needed when Koroseal Tape RX is used in conjunction with Koralac RX solution, the rack being first treated with two or three coats of the solution and the tape then wrapped under firm tension. After this, one or two more coats of the solution are again applied. If the tape is used alone, the rack must be placed in an air oven with a minimum temperature of 300 deg. F. for two hours after the tape has been applied. This fuses the tape together.

The plating rack solution Koralac RX provides a corrosion-resistant, tough, inert coating with good insulating properties, satisfactory for nearly all kinds of plating rack service. Liquid at room temperature, it holds its position on the racks after application because of shrinkage as the solvent evaporates.

Application of Koralac RX to plating racks can be accomplished by dipping or painting. All sharp edges of the rack must be removed by filing or grinding. Each coat should be allowed to dry thoroughly before the next is applied, with four coats minimum being generally recommended. The solution dries readily at room temperature, but drying can be hastened in an air oven at about 150 deg. F. The solution is supplied in one and five-gallon cans and 50-gallon drums. One gallon will coat approximately 80 sq. ft. with a film thickness of 0.0015 in. when the dip method is used.

BETTER FINISHING at Lower Costs

This polishing machine provides both High Speed and Fast Feed surfacing—for polishing outside diameter of tubing, rods and bars of steel and other materials. It is provided with centerless feed for cylindrical work. No centering, no chucking, no holding. Can be operated with inexperienced labor.



Type No. 101 Production Centerless Feed Polishing Machine

PRODUCTION MACHINE CO.

GREENFIELD • MASS.

Translucent Protective "Skin"

A translucent "skin" for protecting machine parts in shipment has been developed by The Dow Chemical Company, Midland, Mich. The product, which has an ethylcellulose base, is a plastic-like substance which is applied by a simple hot dip process; it sets into a tough-skin-tight coat in a few seconds and fully protects metal from rust, corrosion and dirt during shipment. Assembly crews can strip it off quickly and easily with no equipment other than an ordinary pocket knife.

The material used is not yet available for general distribution, being under rigid government control. The types of parts which can be treated by the coat-

THOSE PERFECT PARTNERS FOR PICKLING

NEP and SUMFOAM

TO CONTROL ACID AND FUMES IN THE PICKLING DEPARTMENT. SAVE ACID, METAL AND WORRY. SUCCESSFUL FOR "28 YEARS IN STEEL".

THE WM. M. PARKIN CO. • Highland Building, Pittsburgh, Pa.

ing process are not yet completely defined. Its use is already apparent in many cases. Adaptations of the method are constantly being extended under rigid military supervision. It is claimed that the skin is so effective in protecting metal from dirt, salt air and salt water that parts may even be tossed overboard at high tide near invasion points, to be recovered later by repair crews.

Sterling S-184 Identifiers

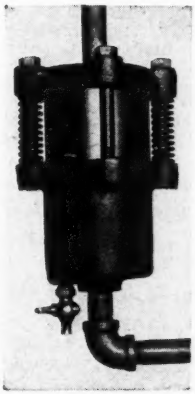
The Sterling Varnish Company, 168 Ohio River Blvd., Haysville (suburban Pittsburgh), Pa., announces the S-184 Identifiers, a group of colored identification coatings for tracer wire applica-

Containers for S-184 Identifiers

tions, which expedite the winding of electrical equipment. S-184 Identifier can be applied by running the wire through the varnish or by dipping the entire coil of wire in it. It is said to give a smooth finish and dry exceedingly fast, permitting handling in less than one minute after application. The Sterling identification coatings can be supplied in any color.

Micromax pH Recorders. Wherever it is important for operators of industrial processes, such as neutralization, precipitation, corrosion-prevention and

DRY
COMPRESSED AIR



● Universal Air Filters have proven their superiority over many years' use on compressed air lines for removing condensed moisture, oil and other impurities.

The synthetic porous stone used as a filter medium (in addition to the well-known principle of centrifugal action) causes this filter to deliver pure, dry air for process use by the leading Industrials of the United States.

Two filter stones are furnished with each unit to assure continued operation during simple cleaning process. Maintenance is easy and inexpensive.

Write for detailed information and circular.

UNIVERSAL FILTER COMPANY
Manufacturers
7025 Manchester Ave. • St. Louis, Mo.

boiler feed-water treatment, to be able to "see" pH at a glance or to refer to a continuous pH record drawn on a handy-easy-to-file chart, a catalog issued by Leeds & Northrup Company should be of interest.

It describes an equipment which consists of just two elements: an unusually rugged glass-electrode assembly and a Micromax Recorder—either a strip-chart Model S or a round-chart Model R. Where operators should have an unusually bold guide to pH, the Model R is used. It indicates by means of a big pointer which moves around a large dial; in addition, it draws a continuous record on a 24-hour chart. For a more detailed record of pH, over a longer period of time, the Model S is used.

For a copy of Catalog N-96(1), "Micromax pH Recorders," write to Leeds & Northrup Company, 4934 Stenton Ave., Philadelphia 44, Pennsylvania.

Solvent Vapor Degreasers. G. S. Blakeslee & Co., Cicero Station, Chicago, Ill., is now distributing a catalog on Blakeslee Solvent Vapor Degreasers. It is a 24-page book which describes the different types of degreasers and gives information on many standard and special applications. Copy of this data book free upon request.

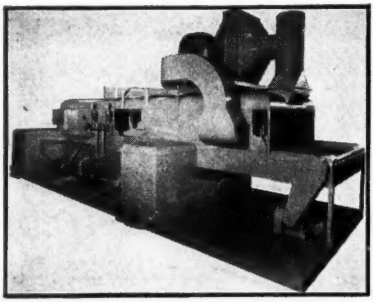
De-Scaling. Designed to meet the demand for practical information on methods for quickly and safely ridding water-cooled and water-circulating equipment of insulating lime-scale and rust deposits, an Oakite De-Scaling Manual revised and enlarged, is now available to plant executives responsible for war time maintenance.

The manual contains 28 pages of concise practical data that is now being successfully used to step up output of existing equipment, shorten shut-down time and conserve manpower in cleaning and de-scaling varied types of equipment common in the metal-working industry. In connection with this work, it is stated that an acid-type scale-dissolving material, known as Oakite Compound No. 32, eliminates the hazards to personnel and equipment and avoids the need of tedious time-consuming mechanical methods on a wide range of scale and rust removal work.

Of special interest to production execu

SOL-KLEAN
for
Better Paint Adhesion
INDUSTRIAL CHEMICAL PRODUCTS CO.
DETROIT 7
Milwaukee Fort Wayne

WE RECOVER YOUR
SOLVENTS and THINNERS
from Sludge, Waste, Wash, Spoiled Lacquers, etc.
AND SAVE YOU MONEY
Each shipment—one drum or a carload—receives PROPER and SEPARATE TREATMENT.
Solvents recovered by the Lofgren Process.
Write to:
SOLVENTS RECOVERY SERVICE, Inc.
1019 Broad St. Newark, N. J.
or
HAMMOND CHEMICAL SERVICE, Inc.
241 Brunswick St. Hammond, Ind.



HYDRO-FLOW
INDUSTRIAL WASHING MACHINES
Streamlined design. Recirculating hot or cold air blow off. Hidden motors, pumps and pipes are easily accessible. Piping and nozzles located to insure thorough cleansing of all surfaces. Rugged and efficient pressure pump. Corrosion resistant spray nozzles—from mist to open stream. Handling alkali to varsol as cleaner. Monorail, Belt, or Gravity type conveyors designed to carry any shape or size material. Variable speeds on conveyor drive synchronize production.
INTERNATIONAL CONVEYOR & WASHER CORP.
Write for circular.
640 E. FORT ST. DETROIT, MICH.

tives is the information presented in the manual on how Oakite Compound No. 32 is being widely used to remove mill scale and other scale deposits from heat treated, hardened, annealed or welded war supply items before subsequent finishing operations and to rid parts of rust between manufacturing or assembly operations. Copies of this specially prepared, illustrated manual are available on request. Write to Oakite Products, Inc., 20 Thames St., New York 6, New York.

Anozinc. An informative four-page leaflet has recently been prepared which describes Anozinc, a fast, easily controlled means of increasing the rust-resistance of zinc-coated steel parts and of retarding the formation of white zinc corrosion products. It is applicable to zinc plated on any metal, and, in some cases, to zinc base die castings. For countless parts now being plated or black finished, the treatment is said to provide improved appearance as well as long service life. Parts finished in Anozinc blaths have stood up in excess of 20 hours under the Army-Navy salt spray test AN-QQ-S-91. Two attractive finishes are available—a dark, semi-lustrous black and a brassy, slightly iridescent yellow.

Address your request for Bulletin PF to United Chromium, Inc., 51 East 42nd St., New York 17, N. Y.

Gas-O-Dome Regulators. An eight-page illustrated folder which describes several models of Victor Gas-O-Dome Regulators has been issued by Victor Equipment Company, 844 Folsom St., San Francisco, Calif. The regulators have gas-loaded, instead of spring-loaded, diaphragms and are designed for use where high inlet and delivery pressures must be handled. Copy of the folder free upon request.

Military Parts Packaging Chart. Government requirements for packaging military machinery and parts are summarized in a handy chart prepared by the Cellophane Technical Section of E. I. du Pont de Nemours & Company. The compilation is based on the various packaging specifications issued by the Ordnance Corps, Engineering Corps and

New, Safe, Efficient METAL CLEANER

The Perfect Substitute for Chlorinated Solvent Degreasing

LENBA-SOLV the new emulsifying cleaner, is the ideal salution of your metal cleaning problems. Actually dissolves all types of soil (oil, greases, buffing, cutting and lapping compounds of all types, cutting and machining coolants) on either ferrous or non-ferrous metals, by immersion and water rinse. (Stubborn cases may require gentle agitation). LENBA-SOLV is water soluble and is a powerful emulsifier and penetrant. Produces sparkling surfaces completely clean for all purposes. Will not stain or discolor. Is 100% safe, (160° F. Flash Point) odorless, stable, neutral—and extremely economical, because it emulsifies the dirt and grease which is carried off in the water rinse, keeping LENBA-SOLV clean indefinitely. Can be easily used with your present degreasing equipment or in any tank with heating equipment. Available in unlimited quantities on low priorities.

READY FOR IMMEDIATE DELIVERY

LENBA Products Corp.

408 CHANIN BLDG., NEW YORK, N. Y.

ORDER TODAY!

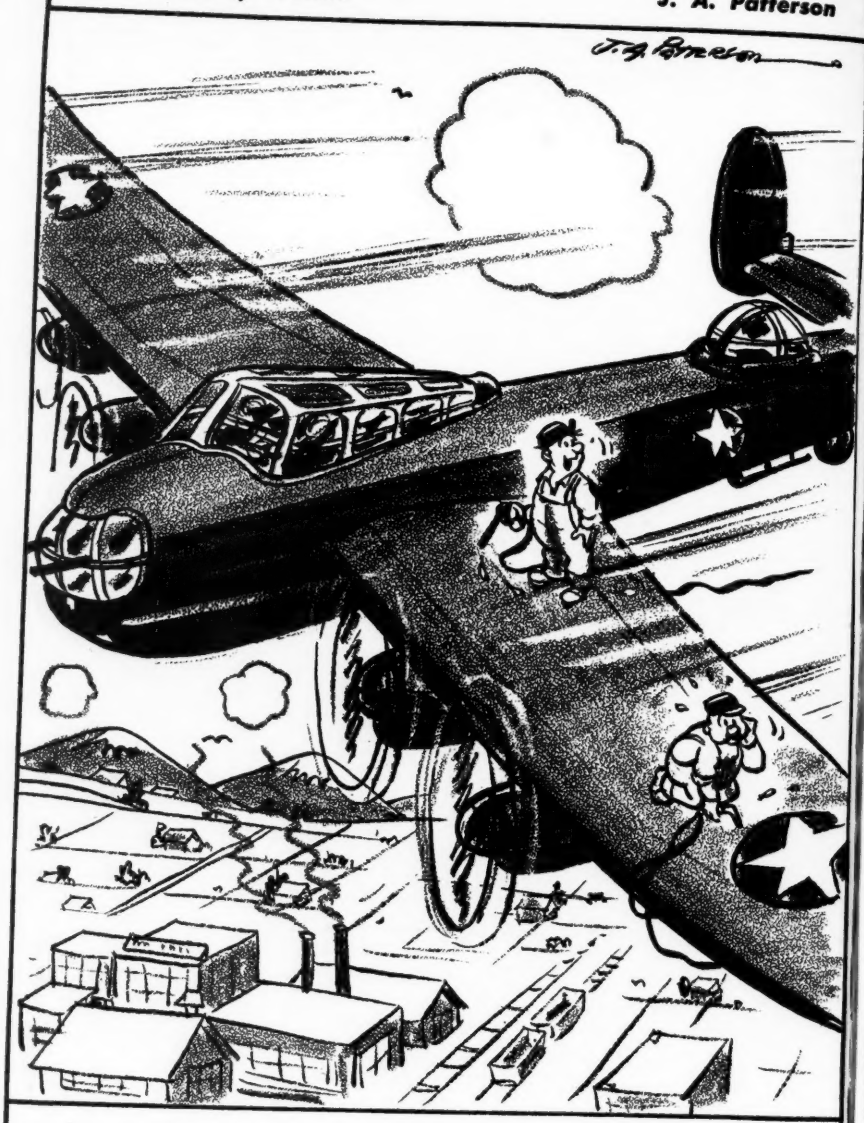
One drum of LENBA-SOLV will prove its merits to you. Order today—and we will rush it to you with full simple directions.

LENBA-SOLV . . .
$44.50 per Drum,
plus deposit.

Prices are f.o.b. New York or Chicago.

The Finishing Touch

J. A. Patterson



"Sure rushin' these babies out fast now, ain't they?"

Air Corps, as well as those used jointly by the Army and Navy. Properties and construction of grades A, B and C wrapping materials are listed, including cellophane laminated sheeting, together with the three strength types under each grade.

The specified methods of packaging are also outlined and under each method are given a number of typical parts for which the method is employed, such as air cleaners, carburetors, firing mechanisms, gun mounting plates, hydraulic brake parts, roller and ball bearings, airplane instruments and motors, tachometers, and so on.

Copies of the Military Parts Packaging Chart may be obtained by writing the Technical Section, Cellophane Division, E. I. du Pont de Nemours & Co., Inc., Wilmington, Delaware.

"18 Ways to Save Time and Money" is the title of a folder distributed by Mead Specialities Co., 15 S. Market St., Chicago 6, Ill. Included in the folder are 18 photographs, with explanatory captions, which show actual jobs being performed with the Mead Industries Burring Machine. Copy free upon request.

BEAVER
BARREL FINISHING RESEARCH

The only Internationally recognized Barrel Finishing Research organization in existence whose sole effort over a period of thirty-two years has been the development of methods and materials for mass production effort in barrels.

H. LEROY BEAVER
LANSDALE, PA., U. S. A.

Investigate the coating of surfaces with . . .

FLOCK

Rayco Flock is textile fibres cut to extremely short uniform lengths, applied by adhesive to form a solid, even coating.

FUNCTIONAL

Used in airplane, auto and numerous other industries for—
SOUND DEADENING • TEMPERATURE INSULATION • INTEGRAL GASKETS • SHOCK-ABSORBING SURFACE • NON-MAR SURFACE PROTECTION.

DECORATIVE

Applied in various lengths and colors to wood, paper, cloth, metal, etc., the following effects are produced:
SUEDE LEATHER • FURNITURE UPHOLSTERY FABRICS • AIRPLANE AND AUTO UPHOLSTERY FABRICS • VELVET • VELOUR • MOHAIR.

REQUEST SAMPLES AND PRICES

RAYON PROCESSING CO. OF R. I., INC. • **55 TREMONT STREET CENTRAL FALLS, R. I.**

CATALOGS

FOR YOUR LIBRARY

To obtain copies of the catalogs listed here, indicate on the coupon the number of the item in which you are interested and mail as directed.

1. Industrial Fire-Fighting

A manual entitled "How to Teach Fire-Fighting" which tells how to stage a fast-moving, interesting, instructive fire-class can be obtained from Walter Kidde & Company, Inc., 431 West St., Bloomfield, New Jersey.

2. Silco

Data on Silco, an inorganic, vitreous-type, low baking point finish for steel, which is resistant to corrosion, abrasion, high heat, impact, scratch, acids, mild alkalis, and solvents, is available from Mitchell - Bradford Chemical Company, Bridgeport, Connecticut.

3. Metal Cleaning Equipment

A four-page folder which illustrates and describes a well-rounded line of equipment for cleaning war products such as cartridges, gun barrels, shells and similar products is now being issued by the Alvey-Ferguson Company, 162 Disney St., Cincinnati, Ohio.

4. Cleaning with Sun Spirits

Interesting case histories of the use of Sun Spirits in metal cleaning are described in a folder issued by Sun Oil Company, Philadelphia, Pennsylvania.

5. Deoxodizing

The process of Deoxidizing steel artillery shell cases or other steel and aluminum ordnance parts for varnish and paint finishes with Deoxidine No. 170 is the subject of a folder available from American Chemical Paint Company, Ambler, Pennsylvania.

6. Cleaning and Finishing

A data book which contains important information on the design and applications of Howard metal cleaning and finishing machinery has just been prepared by Howard Engineering & Mfg. Co., 1056 Hulbert St., Cincinnati 14, Ohio.

7. Metal Parts Washers

Various models of Detrex Washers are pictured and described in a catalog issued by the Detrex Corporation, 1301 Hillview Ave., Detroit, Michigan.

8. Shell Cleaning with DuBoy Products

A data sheet describing the soaker tank method with Actex 200, the solvent method with Actusol, and the industrial washing machine method with Actex 200 is now being distributed by The DuBois Company, 1120 W. Front St., Cincinnati, Ohio.

9. Instruction Manual

Latest technical data on the use of Oakite Compound No. 84, an acid-detergent material for ridding ferrous and non-ferrous parts of deposits that require a special type of acidic action to remove them, is given in a manual available from Oakite Products, Inc., 20 Thames St., New York 6, N. Y.

10. Lead Plating

Harshaw Chemical Co., 1945 E. 97th St., Cleveland, Ohio, has available a bulletin which describes lead plating with Harshaw fluoborate lead solution concentrate—suggested uses, solution preparation, equipment and procedure.